REPORT RESUMES

ED 016 262 56 CG 001 355

THE VALIDATION OF AN AUTOMATED COUNSELING SYSTEM.

BY- FRIESEN, DELOSS D.

SYSTEM DEVELOPMENT CORP., SANTA MONICA, CALIF.

REPORT NUMBER BR-5-0738 PUB DATE 20 AUG 65
REPORT NUMBER TM-2611-000-000
REPORT NUMBER NDEA-VIIA-1130
EDRS PRICE MF-$0.75 HC-$7.92 196P.

DESCRIPTORS- AUTOMATION, *COUNSELING, *COMPUTER ORIENTED PROGRAMS, *HIGH SCHOOL STUDENTS, *EDUCATIONAL PLANNING, COUNSELING EFFECTIVENESS, COUNSELOR PERFORMANCE, SCHOOL AND COLLEGE ABILITY TEST

THE VALIDITY OF A COMPUTER BASED COUNSELING SYSTEM WAS TESTED BY COMPARISON OF ITS EFFECTIVENESS WITH THAT OF TWO COUNSELORS IN--(1) PRE- AND POST-INTERVIEW PUPIL APPRAISAL, (2) STUDENT EDUCATIONAL DECISIONS, AND (3) THE COMPLETENESS OF EDUCATIONAL PLANS. INTERVIEWED BY A MODEL COUNSELOR AND THE COUNSELING SYSTEM WERE 20 NINTH-GRADERS. AN EQUAL NUMBER OF STUDENTS WERE INTERVIEWED BY A SECOND COUNSELOR AND THE COUNSELING SYSTEM. INTERVIEW RESULTS, STUDENTS' SEX, SCHOOL AND COLLEGE ABILITY TEST SCORES, SOCIOECONOMIC LEVEL, AND FINAL TENTH GRADE PLANS WERE COLLECTED FOR ANALYSIS. DATA ANALYSIS METHODS ARE DISCUSSED. RESULTS INDICATE THAT--(1) THE DEVELOPMENT OF A COMPOSITE COUNSELING MODEL WHICH WOULD INCORPORATE THE BEST FEATURES OF SEVERAL COUNSELORS IS POSSIBLE, (2) THE CURRENT AUTOMATED COUNSELING SYSTEM, WITH THE MODIFICATIONS DISCUSSED, HAS VALUE AS A COMPUTER-BASED PUPIL INFORMATION SYSTEM AND IS USEFUL AS AN EDUCATIONAL PLANNING AID IN CONJUNCTION WITH A COUNSELOR, AND (3) MOST STUDENTS WOULD VOLUNTARILY USE THE AUTOMATED COUNSELING SYSTEM IF IT WERE IMPLEMENTED INTO A SCHOOL SYSTEM. (PS)

ED016262

SDC

TM-2611/000/00

The Validation of an Automated Counseling System

20 August 1965

CG 001 355

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

TM-2611/000/00

TECHNICAL MEMORANDUM

(TM Series)

This document was produced in performance of System Development Corporation's independent research program.

The Validation of an Automated Counseling System

by

Deloss David Friesen
Counseling Center
State University of New York
Albany, New York

20 August 1965

SYSTEM
DEVELOPMENT
CORPORATION
2500 COLORADO AVE.
SANTA MONICA
CALIFORNIA

The Validation of an Automated Counseling System

by

Deloss David Friesen*

ABSTRACT

SDC document TM-2582, entitled "Explorations in Computer-Assisted Counseling" by John F. Cogswell and Donald P. Estavan, describes research that eventuated in a computer-based model that was designed to simulate the behavior of a school counselor in two related tasks: the appraisal of students from data in the cumulative student record and the educational planning interview.

Three institutions cooperated in the research project--System Development Corporation, University of Oregon, and the Palo Alto School District.

Dr. Friesen's paper, which represents his doctoral dissertation, is concerned with the validity of the automated systems. Forty 9th-grade students from the Palo Alto School District participated in the validation study. The cumulative records of the 40 students were analyzed by the automated appraisal program and the 40 students participated in the automated educational planning interview. Twenty of the 40 students also were interviewed by the original counselor whose behavior was being simulated by the automated program. The other 20 students were interviewed by a second counselor from the school district. Both counselors made appraisals of the students from the student cumulative record. The performance of the automated counseling system was compared to the performance of the two counselors on the following four variables: the appraisal of pupil records prior to the interview, the post-interview appraisal of students, the educational decisions made by the students, and the completeness of students' educational plans.

---

*Formerly of the Graduate School in Education at the University of Oregon. Currently with the Counseling Center, State University of New York, Albany, New York.

TABLE OF CONTENTS

Page

LIST OF TABLES 5

LIST OF FIGURES 9

Chapter

I STATEMENT OF THE PROBLEM 11

Introduction
Problem
Background and Rationale for the Study
Objectives
Summary

II REVIEW OF THE LITERATURE 28

Need for Counseling Services
Computer Research

III PROCEDURES 46

Overview
Specifications of the Automated Counseling System
Procedures
Data Analysis

IV RESULTS 78

Introduction
Results

V SUMMARY AND CONCLUSIONS 145

Summary
Discussion and Conclusions

TABLE OF CONTENTS-continued

Page

BIBLIOGRAPHY 164

APPENDIX

A PROGRAM FOR AUTOMATED INTERVIEW 166

B PRE-INTERVIEW PUPIL APPRAISAL - COUNSELOR 180

C PUPIL APPRAISAL CHECK LIST. 181

D POST-INTERVIEW PUPIL APPRAISAL - COUNSELOR 182

E STUDENTS COURSE SELECTION FORM 183

F QUESTIONS FOR ANALYSIS OF MACHINE LIMITATIONS 184

G AREAS TO BE COVERED IN COUNSELORS' INTERVIEW 185

H ACTUAL AUTOMATED INTERVIEW 186

LIST OF TABLES

Table Page

1. Table of F's for Pre-interview Pupil Appraisal Comparing the Automated Counseling System with the Model Counselor 82

2. Table of Treatment F's for Post-interview Pupil Appraisal Comparing the Automated Counseling System with the Model Counselor 85

3. Table of Order F's for Post-interview Pupil Appraisal Comparing the Automated Counseling System with the Model Counselor 86

4. Table of Interaction F's for Post-interview Pupil Appraisal Comparing the Automated Counseling System with the Model Counselor 87

5. Table of Treatment F's for High School Course Planning Comparing the Automated Counseling System with the Model Counselor 90

6. Table of Order F's for High School Course Planning Comparing the Automated Counseling System with the Model Counselor 92

7. Table of Interaction F's for High School Course Planning Comparing the Automated Counseling System with the Model Counselor 93

8. Table of Treatment F's for Completeness of Course Plans Comparing the Automated Counseling System with the Model Counselor 96

9. Table of Order F's for Completeness of Course Plans Comparing the Automated Counseling System with the Model Counselor 97

LIST OF TABLES-continued

Table Page

10. Table of Interaction F's for Completeness of Course Plans Comparing the Automated Counseling System with the Model Counselor 98

11. Table of F's for Pre-interview Pupil Appraisal Comparing the Automated Counseling System with the Second Counselor. 100

12. Table of Treatment F's for Post-interview Pupil Appraisal Comparing the Automated Counseling System with the Second Counselor 103

13. Table of Order F's for Post-interview Pupil Appraisal Comparing the Automated Counseling System with the Second Counselor 105

14. Table of Interaction F's for Post-interview Pupil Appraisal Comparing the Automated Counseling System with the Second Counselor 106

15. Table of Treatment F's for High School Course Planning Comparing the Automated Counseling System with the Second Counselor 107

16. Table of Order F's for High School Course Planning Comparing the Automated Counseling System with Second Counselor 108

17. Table of Interaction F's for High School Course Planning Comparing the Automated Counseling System with the Second Counselor 109

18. Table of Treatment F's for Completeness of Course Plans Comparing the Automated Counseling System with the Second Counselor. 111

19. Table of Order F's for Completeness of Course Plans Comparing the Automated Counseling System with the Second Counselor. 112

LIST OF TABLES-continued

Table Page

20. Table of Interaction F's for Completeness of Course Plans Comparing the Automated Counseling System with the Second Counselor 113

21. Table of F's for Treatment Effects Between Group I and Group II 115

22. Table of F's for Order Effects Between Machine 1st and Counselor 1st. 118

23. Computer Versus Model Counselor in Terms of Total Course Plans. 122

24. Computer Versus Second Counselor in Terms of Total Course Plans. 123

25. Computer Versus Counselors in Terms of Total Course Plans 123

26. Comparison Between Experimentally Chosen 10th Grade Course Plans and Actual 10th Grade Course Plans 126

27. Nature of Counselor and Machine Course Changes. . . 131

28. Nature of Course Changes Between Machine and Final 10th Grade Plans 132

29. Nature of Course Changes Between Counselor and Final 10th Grade Plans 134

30. Table of F's for Differences Between Sexes 136

31. Table of F's for Differences Between High and Low Scat Groups - National Norms 138

32. Table of F's for Differences Between High and Low Scat Groups - Local Norms 139

LIST OF TABLES-continued

Table **Page**

33. **Table of F's for Differences Between Socio-Economic Levels 142**

LIST OF FIGURES

Figure Page

1. Clarkson's Investment Model -- Flow Diagram 44

2. System Diagram of an Automated Counseling System for Educational Planning 51

3. Treatment Schedule 58

CHAPTER 1

STATEMENT OF THE PROBLEM

Introduction

A school counselor of today is faced with serving approximately four hundred[1] students each year. A professional counselor's duties and obligations are varied. In addition to counseling with students concerning educational, vocational, and personal problems, he may work as a registrar in developing class schedules and assigning students to these classes, keep attendance records, check on truants, write progress reports, consult with staff members, discuss problems with parents, and dispense educational, vocational, and other guidance information. Thus, most counselors have a multitude of activities to perform for a large and varied group of people. However, some of these tasks are somewhat routine in the sense that, while complex, they involve generally repetitive aspects.

Repetitive tasks generally involve a much smaller number of variables than tasks which deal with unique student problems. Because of the relatively small number of variables in some tasks, it should be possible to isolate and identify the component procedures necessary to complete the task. If all relevant components could in fact be identified, then it would be possible to write a computer program which, when put into operation, would yield results similar to those obtained by a counselor. The automation of selected counseling tasks would have several implications: (1) it would permit a greater volume of work to be handled at a faster pace -- thus initiating a financial saving for a school district; (2) it would increase the volume of information stored, decrease the retrieval time of stored information, and permit a more thorough and sensitive analysis of information now available in schools; and (3) it would allow the counselor to spend more time in counseling with students needing help with non-repetitive problems.

---

[1] C. Gilbert Wrenn, The Counselor in a Changing World, American Personnel and Guidance Association, 1962, p. 192.

Problem

The problem with which this study is concerned is the validity of a computer-based counseling system, which has been developed to simulate the decision-making behavior and logic of a counselor counseling with ninth grade students in regard to their educational planning for high school.

Background and Rationale for the Study

While this study is not concerned with the development of the automated counseling system per se, it may be helpful to review the background and rationale of the automated counseling system to understand more clearly the nature of the automated system and the problem it seeks to alleviate.

Demand for Counseling Increasing

The demand for counseling services in schools is increasing rapidly. Wrenn[2] indicates that the number of high school age people, 14-17 years of age, will double in the period between 1950 and 1980. The increased complexity of decisions created by our rapidly developing society will cause the job of the school counselor to become more important and demanding.

Two Basic Alternatives for Meeting Demands

The Addition of More Personnel.

The Use of Automated Techniques in Counseling.

This would have the following results:

1. automating repetitive tasks, and
2. increasing the use of information.

---

[2] _Ibid._, p. 17.

Rationale for the Selection of the Second Alternative

The first alternative is unlikely because the addition of more personnel is expensive, and a decrease in the pupil-counselor ratio is not probable. Although more counselors are being prepared, the growth of the schools is keeping the pupil-counselor ratio about the same. Since there does not appear to be, in the near future at least, a decrease in the number of students per counselor, the necessity of relieving a counselor of many routine duties so that he can spend more time with students in group or individual counseling sessions is clear. Even if the pupil-counselor ratio were lowered, the addition of personnel would not materially effect the need for better storage techniques, more rapid information retrieval, analysis, and the constant updating of information.

Not only would the automation of certain counseling tasks be beneficial but it is also technically possible. Computer specialists and systems people, as discussed at the 1964 Western Computer Conference, feel that any activity or process that can be defined in operational terms can be automated.

Other applications of computer techniques indicate that automation of specific tasks is possible. However, questions concerning validity and reliability are raised when other computer research is applied to a counseling system. It was necessary to investigate the more specific applicability of computer technology to specific counseling tasks.

Before the theory of anything that can be operationally defined can be automated could be put into practice, it was necessary not only to find a task but also to find a counselor whose behavior could be defined.

Selection of the Task

Tyler[3] says that much of counseling is oriented toward the making of decisions. Loughary[4] and Gelatt[5] also feel that decision-making is one of the most important functions of the adolescent, and many of the problems of high school students arise from the inability to make appropriate decisions.

Working from a decision-making frame of reference, then, it was necessary to select a decision-making task to be simulated.

---

[3] Leona E. Tyler, The Work of the Counselor (New York: Appleton-Century-Crofts, Inc., 1953), p. 228.

[4] John W. Loughary, Counseling in Secondary Schools (New York: Harper & Brothers, 1961), p. 23.

[5] Harry B. Gelatt, "Decision Making: A Conceptual Frame of Reference for Counseling," The Journal of Counseling Psychology, Vol. 9, No. 3, 1962, pp. 240-246.

The educational planning interview of ninth grade students in preparation for high school was chosen because it is a decision-making task, it represents a considerable amount of time which must be expended by a counselor, the number of alternatives involved are fewer than would be found in decision-making tasks of a more complex nature, and high school counselors have defined educational planning interviews as repetitive tasks.

Selection of the Counselor

In the preliminary study the counseling behavior of over forty secondary school counselors from various parts of the United States, who were selected by their supervisors as being expert counselors, was analyzed. This analysis was to determine if their counseling techniques, while performing a specific counseling task, could be operationally defined to permit possible future programing for use in a computer-based interview.

This research was done to determine how much, and what aspects, of counselor pre-interview (verbalized thoughts about the student and his past, present, and future status as gained through reading the student's cumulative record folder) and interview (verbal interchange between the counselor and student during the counseling interview) behavior can be automated, i.e., performed by a computer and related equipment.

The results of the preliminary study indicate that many high school counselors behave, while performing counseling functions, according to more or less systematic sets of rules. These rules varied from the making of predictions about the student based on family, social, and personal factors to more concrete rules such as academic predictions based on GPA, telling students they must have a B average to carry five solids, or how many special units a student must have for entrance into a certain type of university. These rules can be identified by an analysis of counselors' tape-recorded behaviors, interview and pre-interview, using a systems approach, and with de-briefing sessions in which the counselors were asked to clarify their logic and behavior. These rules can be programed so that a computer, with the aid of an input-output device -- similar in appearance to a typewriter -- could interview the student.

Although several counselors were found who met the criteria of using consistent rules in both interviewing and pre-interviewing functions, only one was chosen to be the model for the automated counseling system. Not only did he use consistent rules which could be readily identified, but the school district in which he works has done an extensive follow-up on the students which allows the counselors to make accurate predictive statements about the students.

The Automated Counseling System

Based on the findings of the preliminary study, a research team[6] developed a computer-based system which attempts to simulate the counseling behavior and logic exhibited by one secondary school counselor during educational planning interviews with ninth grade students.

In addition to determing how well the automated counseling system simulates the outcomes of the model counselor, the extent of agreement between the automated system and a second counselor is investigated. If an automated counseling system is to have practical value, it must not only produce results similar in nature to those of the model counselor, but should also produce results similar to those of other counselors in the school district who are using the same data and norms used by the model counselor.

The Purpose of this Study

The present study attempts to ascertain whether or not the simulated counseling program actually duplicates the results achieved by the model counselor and the second counselor in their usual counseling interviews.

---

[6] The research team was composed of Dr. J. W. Loughary, Robert Hurst and the writer -- doctoral students at the University of Oregon -- and Dr. John Cogswell and Donald Estavan of Systems Development Corporation.

Implications

The introduction of an automated counseling system into a school system would offer some advantages in addition to educational planning. The automated counseling system being investigated in this study would need minor modifications in some cases to be suited for the projected tasks listed below.

Group Counseling. While having an interview with the automated system a student could request a personal interview with the counselor. After making his request the student could also indicate if a group counseling session would be satisfactory. If so, he would state the nature of his problem. Many of the students' problems may be similar in nature. Instead of having, for example, twenty-five individual counseling sessions, on the basis of these self-referrals, the counselor may find it beneficial to have three or four group sessions, each taking a particular problem area. For those students still having problems unique to themselves, individual counseling sessions could be arranged.

Scheduling of Interviews. After investigating the interviews of students who have been counseled by the automated system, it may be possible to isolate four or five problem areas most frequently used as reasons for requesting further counseling. These problem categories could be included, along with another category labeled "other problems," in a revised machine interview program. If the computer were given the time schedules of the students and the counselor, on the basis of the problem area chosen in the automated interview, both group and individual counseling sessions could be scheduled by the computer. A print-out giving the time and the place of the interview could be given to the counselor and the students.

Collect, Store, and Retrieve Information. As more schools are initiating research projects the collection of data becomes more important. The more often these data are used the more often they must be up-dated. In the up-dating process and other applications the speed of retrieval becomes highly important. As school systems grow and as more areas of importance about people are found the sheer bulk of information is tremendous.

One of the side benefits of having an automated counseling system is that the equipment necessary, electronic data processing equipment, for the handling of this vast quantity of information would be in operation -- needing only further programing to extend its range of usefulness.

Problems for Further Research in Counselor Simulation

Pre-college Educational Planning. The transference between planning for high school and for college would be relatively easy. The logic would be the same but the complexity involved in college planning would be much greater. Instead of meeting the requirements for one high school, the computer would have to have courses, prerequisites, and requirements for a large number of colleges and universities stored in its memory.

Vocational Planning. Vocational planning is related to the educational interview because of the linkage between most occupations and the training necessary for these occupations. A great deal of information concerning training requirements, entry occupations, salary, job descriptions, and working environment would have to be stored in the computer. Although the task is large the new large core-memory computers make it possible.

Personal Problem Counseling. This is the area where there would probably be the greatest number of situations and problems unique to the individual. These problems are usually not resolved in just one interview. As unique as these problems are, there may be found similarities which could be programmed. The automated interview system in personal problem counseling could be used as the first, or intake, interview where general questions and problems are handled. The succeeding interviews would be more specific, and handled by a counselor who was aware of the problems expressed during the machine session. The computer could also schedule the student for group sessions with other individuals expressing the same problems.

Developing a Counselor Model. Instead of simulating the behavior of one counselor, research might be generated in the direction of looking at a group of expert counselors and simulating the total group's behavior and thinking. The strengths of one counselor might then be used to overcome the weaknesses of another. Any of the previously mentioned counseling tasks could be used in this group simulation project.

Objectives

General Objective

The general objective of the research with which this study is concerned is to determine the validity of an automated counseling system. The validity criteria, which are discussed more fully below, are the outcomes of the counseling interview after which the automated counseling system was modeled.

Specific Objectives

The proposed study has the four following specific objectives:

1. To determine and demonstrate the extent to which a computer-based counseling system can produce the same results as the traditional counselor, after whom the computer-based system was modeled. The extent of agreement is determined by the amount of difference between the two interview modes in regard to:

   a. pre-interview pupil appraisal. On the basis of cumulative record data, both counseling modes predicted the high school GPA. Fourteen other appraisal statements relating to such factors as underachievement, overachievement, and probability of future academic difficulties were generated,

   b. post-interview pupil appraisal. The realism of the student's plans and courses selected was determined by each counseling mode,

   c. educational decisions -- for each interviewing mode a course schedule for the high school years was made, and

   d. completeness of educational plans -- after each interview the number of students making total plans, partial plans, and no plans was recorded.

2. To determine the extent of agreement between the automated system and a second counselor from the same school district as the model counselor, but who was not involved in the rule-building phase of the study. The second counselor is compared with the automated counseling system in regard to:

   a. pre-interview pupil appraisal,
   b. post-interview pupil appraisal,
   c. educational decisions, and
   d. completeness of educational plans.

3. To compare the differences between the students interviewed by the automated counseling system and the model counselor, and the students interviewed by the automated counseling system and the second counselor in terms of interview outcomes in regard to:

a. pre-interview pupil appraisal,
b. post-interview pupil appraisal,
c. educational decisions, and
d. completeness of educational plans.

4. To identify specific limitations of the computer-based counseling system.

a. machine limitations -- are the rules and the information on which the program was built general and inclusive enough to allow the student to select a course program comparable with one selected by being interviewed by a counselor? If the student is unable to make total course plans, does he see this as related to the clarity of the presentation or to the amount of information of the automated interview?

b. attention span -- does the student respond to the automated counseling system by early termination of the interview, and by stating that the machine interview made him bored and restless?

c. lack of reinforcers -- do the students feel that lack of feedback, knowing whether their response was appropriate or inappropriate, made it more difficult to select courses? Do the students feel that this lack of feedback was because of the design of the machine program or the lack of the presence of a counselor?

d. lack of sensitivity to the student's needs and orientation towards counseling -- does the student feel that the automated interview meets his need in regard to high school course planning? Although the machine is not a human being, does it meet the student's expectations of what a counseling session in educational planning should be?

e. lack of student cooperation -- what percentage of the students attempt to jam the machine or input ridiculous responses?

f. reservations about course plans -- how does the group counseled by the machine compare with those counseled by a counselor in terms of certainty about chosen courses?

Hypotheses

Regarding the specific objectives the following three major hypotheses are tested.

1. The automated counseling system will not be significantly different from the model counselor regarding:
    a. pre-interview pupil appraisal,
    b. post-interview pupil appraisal,
    c. educational decisions, and
    d. completeness of educational plans.
2. The automated counseling system will not be significantly different from the second counselor regarding:
    a. pre-interview pupil appraisal,
    b. post-interview pupil appraisal,
    c. educational decisions, and
    d. completeness of educational plans.
3. The extent of agreement between the automated system and the model counselor will not be significantly different from the extent of agreement between the automated system and the second counselor regarding:

a. pre-interview pupil appraisal,

b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of educational plans.

Summary

This chapter has discussed the background and rationale of the study, pointing up the need for such an investigation in the light of the demands of the job now being placed on counselors and the increasing demands of the job in the future. Also, it was indicated that such a study is technically possible, and some of the implications for future applications of computer technology were given. It has stated that the problem is the validity of a computer-based counseling system, which was developed by attempting to simulate the outcomes produced by a secondary school counselor, and the general objective is to determine the validity of this automated system. The specific objectives involve: (1) determining the agreement between the automated system and the model counselor in regard to pre-interview pupil appraisal, post interview pupil appraisal, educational decisions and completeness of educational plans; (2) determining the agreement between the automated system and the second counselor in regard to pre-interview pupil appraisal, post interview pupil appraisal, educational decision, and completeness of educational plans; (3) comparing the differences of those students counseled by the machine and the second counselor regarding pre-interview pupil appraisal, post interview pupil appraisal, educational decisions, and completeness of educational plans; and (4) identifying specific limitations of the computer-based counseling system in regard to machine limitations, attention span, lack of reinforcers, lack of sensitivity, lack of student cooperation, and reservations about course plans. In terms of the specific objectives the following three major hypotheses are tested: (1) the automated counseling system will not be significantly different from the model counselor regarding pre-interview pupil appraisal, post-interview pupil appraisal, educational decisions, and completeness of educational plans; (2) the automated counseling system will not be significantly different from the second counselor regarding pre-interview pupil appraisal, post-interview pupil appraisal, educational decisions, and completeness of educational plans; and (3) the extent of agreement between the automated system and the model counselor will not be significantly different from the extent of agreement between the automated system and the second counselor regarding pre-interview pupil appraisal, post-interview pupil appraisal, educational decisions, and completeness of course plans.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter will attempt to support the importance and the feasibility of this study in two areas: (1) the need for counseling services; and (2) the technical possibility of constructing an automated counseling system. The first area will be investigated by identifying the changes in our society which influence the need for greater counseling services. The second area will be concerned with reviewing theoretical and research literature in human simulation and decision-making by electronic computers.

Need for Counseling Services

Increase in Population

On January first of 1964 the population of the United States reached almost 191 million people. The annual growth in millions is currently about 2.7 (1.3%). Eighty-nine percent of the growth is due to net population increases -- births minus deaths -- and 11% is from civilian migration (Current Population Reports, Series P-25, No. 278, January 29, 1964).[1]

---

[1] Max F. Baer, "Washington Flashes," The Personnel and Guidance Journal, Vol. XLII, No. 8 (April, 1964), p. 744.

Youth Unemployment

The youth unemployment figure for whites has risen from 17.7% in 1962 to 20.5% in 1964 for the 14-19 year olds, and from 8.0% to 8.5% for the 20-24 year olds. Non-whites had an unemployment rate of 22.5% in 1962, which has risen to 33.2% in 1964 for the 14-19 year olds and has dropped from 15.8% to 15% for the 20-24 year olds. The spread between the whites and the non-whites has increased for the 14-19 age bracket but has dropped slightly for the 20-24 year olds.[2] With a combined school drop-out rate of 620,000 out of 5.2 million (11.9%), the problem does not appear to be diminishing.[3]

Juvenile Delinquency

In 1962 four hundred and seventy thousand youthful offenders came before the courts. This figure represents 1.8% of all children aged 10-17 in the country. The population increase for 1962 was 3.5%, while the increase in juvenile delinquency was 10% (Children's Bureau Statistical Series 73, Juvenile Court Statistics -- 1962).[4]

---

[2] Max F. Baer, "Washington Flashes," The Personnel and Guidance Journal, Vol. XLIII, No. 2 (October, 1964), p. 112.

[3] Max F. Baer, "Washington Flashes," The Personnel and Guidance Journal, Vol. XLIII, No. 1 (September, 1964), p. 4.

[4] Ibid.

Increase in School Enrollment

During the years of 1961-63 ninety-one percent of the students aged 16 attended, as contrasted to 88% for 1957-59. Seventy-eight percent of the 17 year olds were in school during 1961-63 compared to 65% in the period of 1957-59. For the colleges during the period of 1958-63 enrollment increased by 33.7% (Current Population Survey conducted by Bureau of the Census).[5]

Educational Changes

A comparison of educational mobility during a generation involving men 20-64 years of age indicated that 55% of men were high school graduates compared with 24% of their fathers. About 26% of the men had completed one or more years of college, while only 10% of their fathers attended college. Also, 39% of their fathers lacked an eighth grade education compared with only 14% of the sons. Among the fathers who did not complete the eighth grade, 75% of their sons completed the eighth grade, and 37% completed high school. Forty-one percent of the sons who had fathers who graduated from high school but did not attend college had at least some college. Also, of the fathers who attended but did not graduate from college, 41% had sons who did graduate (Education of the American Population by Folger and Man).[6]

---

[5] *Ibid.*

Need for Decision-Making

Many of the problems experienced by adolescents are created by the inability to make appropriate decisions. The student who continually creates a classroom disturbance, the juvenile engaging in delinquent acts, the youngster who fights with his parents, or the student who is distressed about his place in the world have goals towards which they are striving. It is not the goal that is creating the problem but the inability to identify alternate courses and the selection of the appropriate plan of action for meeting the goal.

One of the major functions of guidance is to aid students to discover alternative plans of action for their goals and to select the one most appropriate to them. Rothney states that "guidance is largely concerned with choices that individuals make among present and future actions."[7]

Effective decision-making is a skill that is learned. Tyler and Sundberg point out that "what young persons need is not just to make a choice but to learn how to choose."[8] Again, Tyler says, "a person to some extent shapes the pattern of his life by choices and decisions he makes at successive stages."[9] Each satisfactory decision-making endeavor prepares the individual for making satisfactory decisions in the future. It is possible to help the student gain decision-making skills through counseling. The counselor can help the student identify alternative choices and weigh these choices to determine the choice with the greatest payoff. Gelatt writes,

---

[6] Max F. Baer, "Washington Flashes," The Personnel and Guidance Journal, Vol. XLIII, No. 3 (November, 1964), pp. 228-229.

[7] John W. M. Rothney, Guidance Practice and Results (New York: Harper, 1958), p. xx.

> through "decision-making counseling" students are required to learn about themselves and their environment as this information is related to the decision, and by participating in the decision-making process they can learn to make decisions more independently and accept the proper responsibility.[10]

The area of decision-making in which the counselor and the student are most often involved is that of educational and vocational planning. Clarke and Gelatt write, "a major function of secondary guidance service is to aid in the educational and vocational development by facilitating good decisions concerning individual students."[11]

---

[8] Leona E. Tyler and Norman D. Sundberg, Factors Affecting Career Choices of Adolescents, Cooperative Research Project No. 2455 (University of Oregon, 1964), p. 2.

[9] Leona E. Tyler, "Theoretical Principles Underlying the Counseling Process," Journal of Counseling Psychology, Vol. 5 (1958), p. 6.

[10] Harry B. Gelatt, op. cit., p. 241.

[11] Robert Clarke and Harry B. Gelatt, Report on NDEA Guidance Research Project -- Palo Alto Unified School District, January, 1963, Technical Report, p. 4.

Yabroff[12] investigated the feasibility of teaching decision-making to ninth grade students in the area of vocational and educational choice. Two factors were important in preparing the student for decision-making: one was general information relating to colleges and occupations; and the other factor was specific information relating to how well students like him, from his school district, had done in post-high school jobs and college. The first order of alternatives was developed after receiving the general information. The choices were determined largely by the student's interest in various fields. The second order of alternatives was selected from the first by the process of not only knowing what the student would like to do but what the student is capable of doing in the light of what others like him have done.

In Yabroff's study all subjects were given a four week general information course. One-third of the subjects received an additional week of information -- comparing the students to national norms --, one-third of the subjects were given information relating them to local norms, and one-third no further training. The group with the information about local norms did significantly better in making realistic choices, as judged by the guidance staff, than the other two groups. The student in this group was able not only to form numerous alternatives (based on general information) but to determine which of the alternatives allowed him the best chance for success.

---

[12] William W. Yabroff, An Experiment of Teaching Decision-Making to Ninth Graders (unpublished paper, May, 1964).

Discussion

The scene is rapidly changing for America's youth. Not only are there millions of young people more than in past generations, but educational and vocational values are changing as well. The influence of automation and the upward mobility of our society has made the professional and managerial job more desirable and the blue-collar and many of the white-collar jobs less desirable. This means more people will remain in high school and more will set their goals toward college. This also means that the non-academically oriented young person will have increasing difficulties in securing unskilled positions. Another complicating factor is the rise in juvenile delinquency which seems to be a concomitant of population growth.

Not only is the number of students on the increase but the complexity of their problems as well. The scientific revolution has created a change in the nature, and increased the number, of jobs. In order to keep pace, education has had to increase the depth and breadth of its programs. The number of alternatives a student must analyze to make his decisions is greater today than ever before. The amount of information the student must have to select appropriate alternatives is equal in magnitude to the scope of his alternatives.

The counselor must, in order to fulfill his responsibility to the students and society, be permitted to spend more time aiding students with their unique problems and less time with repetitive problems. It is not that repetitive tasks should be slighted, but that a more efficient way of dealing with them must be found. The counselor must also be provided with a way to utilize effectively greater quantities of available information and to dispense the increasing amount of pertinent information to the students. In order for the student to use the information effectively decision-making skills must be taught.

The automated counseling system is a step in this direction. It can free the counselor of certain repetitive tasks, evaluate the information necessary to assess the student's chances for success, provide the students with information, and it can be useful as a tool in aiding the students to learn more effective decision-making.

Computer Research

Introduction

Computers are commonly thought to be a mid-twentieth century development. However, the idea of a digital computer is rather old. A professor at Cambridge, Charles Babbage, planned a computer called the Analytic Engine[13] in the early 1800's. Had the engine been completed it would have been a mechanical device, using wheels and cards, one hundred times slower than the slowest electronic computer but decidedly faster in arithmetic calculations than man.

The world of computers had its real growth in the 1940's and 1950's. The use of computers has been, and still is, largely in the area of mathematical calculations. However, more research is being done in the areas of complex problem-solving and simulation of human behavior.

Definitions of Terms and Concepts

Algorithms and Heuristics. The terms algorithmic and heuristic methods of problem-solving are often encountered. These terms may be defined as follows:

> One very special and valuable property that a generator of solutions sometimes has is a guarantee that if the problem has a solution, the generator will, sooner or later, produce it. We will call a process that has this property an algorithm for that problem. The guarantee provided by an algorithm is not an unmixed blessing, of course, since nothing has been specified about the cost of time required to produce the solutions. For example, a simple algorithm for opening a combination safe is to try all combinations, testing each one to see if it opens the safe. This algorithm is a typical problem-solving process: there is a generator that produces new combinations in some order, and there is a verifier that determines

---

[13] Edward A. Feigenbaum and Julian Feldman, Computers and Thought (New York: McGraw-Hill, 1963), p. 16.

> whether each new combination is in fact a solution to the problem. This search process is an algorithm because it is known that some combination will open the safe, and because the generator will exhaust all combinations in a finite interval of time.
>
> A process that may solve a given problem, but offers no guarantees of doing so, is called a heuristic for that problem. This lack of guarantee is not an unmixed evil. The cost inflicted by the lack of guarantee depends on what the process costs and what algorithms are available as alternatives. For most run-of-the-mill problems we have only heuristics, but occasionally we have both algorithms and heuristics as alternatives for solving the same problem . . . Sometimes, as in chess, everyone plays by heuristic, since no one is able to carry out the algorithm of examining all continuations of the game to termination.[14]

When the number of alternatives is large, humans use heuristic methods. In playing checkers, for example, Samuel[15] estimates that in order to explore every possible path it would take something like 10^{40} moves. If it were possible to make three moves a millimicrosecond, it would take 10^{21} centuries to exhaust all the possible combinations. Because of past checker-playing experience and knowing the rules of the game, the human player decides among several possible moves instead of attempting to analyze every possible move during the course of a game.

In such decision-making activities as choosing a vocation or buying an automobile, heuristics are used since there is no solution at the time of selection which is guaranteed to be the best.

---

[14] Ibid., pp. 114-115.

[15] Ibid., p. 72.

Simulation. In the process of simulating a human, heuristics are used. The cognitive process by which a counselor gives aid to the student is a heuristic one, since there are no known best solutions for the student's goals. The computer program written by analyzing the rules used by the counselor is also heuristic, since, again, no solution is guaranteed best. However, there are solutions that are better than others in the light of the student's capacities and performances.

A distinction should be made between simulation and artificial intelligence. In artificial intelligence the goal is not to copy a human model in either the outcomes or in the process of arriving at the outcomes. The hope is that the program will not only do as well as the human attempting the same task but that it will do better. In simulation research the goal of the researcher is to duplicate that which is done by the human model. The researcher would be disappointed if the outcomes were better or worse -- they must be the same.

The simulation project which this study has attempted to validate is not one of simulating the process of educational planning but of simulating the outcomes that were produced by the counselor.

Research Related to the Development of an Automated Counseling System

An application of the systems approach to the counseling function was cited by Cogswell.[16] He defines systems analysis as

> . . . the analysis or study of a system. The procedures may involve the detailed descriptive analysis of an existing system, in which the various functions, the interactions between subsystems, the flow of information, etc., are analyzed in terms of their effect on total system performance. If the system to be analyzed doesn't actually exist, but has been proposed, a model of the tentatively planned system may be constructed by the use of simulation techniques. By simulating the system and its environments in systems research, functions and interactions can be varied and studies under controlled conditions.

In the development of the automated counseling system a systems approach was used to analyze the pre-interview and interview behavior. The total system was subdivided into components which were analyzed as to their functions and to the interaction with other components.

Cogswell found that a systems approach to a pupil personnel program was helpful in uncovering problem areas.

> Study of the data indicated analysis conducted from a systems frame of reference does uncover problem areas in a relatively short period of time, and that analysis of the total system would yield information that could be used to plan future development of the school district along more effective lines.

---

[16] John Cogswell, The Systems Approach as a Heuristic Method in Educational Development -- An Application to the Counseling Function, Systems Development Corporation (Santa Monica, 1962), pp. 2-3.

In addition, thinking of the role of counseling as a function within a large man-machine system was heuristic in producing hypotheses for systems research in relation to the counseling function.[17]

Cogswell and Estavan have established automated interviewing techniques which are directly applicable, with the exception of the differences of the input-output device, for use in the research project this study is attempting to validate. The laboratory (CLASS)[18] is a computer-based system for individual instruction. A student is given a diagnostic question on a film viewer and selects his answers to each question on the student response console which has a multiple-choice mode. The computer in turn analyzes each response and records those indicated by the computer program. The computer then chooses the next question for the student on the basis of prior responses. The program with some modification is suitable for the interview aspect of the automated counseling system.

The decision-making model of physicians has been adapted to computers in the area of medical diagnosis (Smith[19]). Ledley and

---

[17] Ibid.

[18] John Cogswell and Donald Bushnell, A Computer-Based Laboratory for Automation in School Systems, SP-256, Systems Development Corporation (Santa Monica, March, 1961).

[19] S. C. Vandenberg, H. F. Silberman, L. Uhr, C. F. Wrigley, W. H. Holtzman, and P. A. Smith, "Computers in Behavioral Sciences: The Impact of Computers on Psychological Research," Behavioral Science, Vol. 5 (1960), pp. 170-187.

Lusted[20] have also studied the problem of using computers in medical diagnosis. Both of these diagnostic programs analyze patient histories and current physical status. The results are probability statements concerning the various possible diagnoses and are, in most cases, as accurate as those made by physicians.

An application in the field of psychology was made by Holtzman.[21] In attempting to use the computer in several tasks in a clinical setting, he concluded that a computer cannot interact with the patient as well as the clinician, but the machine would help in: (1) collecting routine information, such as biographical details or Minnesota Multiphasic Personality Inventory responses; (2) processing test protocols; and (3) making certain types of interpretations based on actuarial predictions.

Although Holtzman, in the above study, found interaction between the patient and the machine not as good as between the patient and a clinician, this problem was not a liability in this study. The automated counseling system was not attempting to deal with problems as unique as those found in patients seeing a clinician. However, if the counselee had unique problems outside the scope of the automated interview, he had the opportunity to request an individual counseling session with the counselor.

---

[20] Robert S. Ledley and Lee B. Lusted, "Computers in Medical Data Processing," Operational Research, Vol. 8 (1960), pp. 299-310.

[21] Vandenberg, *et al.*, *op. cit.*

Dr. Joseph Jaffe[22], a Harvard Research Fellow, has developed a computer program for the analysis of psychoanalytic interviews. He says the trained psychiatrist quickly learns to interpret what is in the interview, but often needs as many as ten interviews to determine and interpret what is not, the omissions, in the interview. The analysis of interviews, called psycho-linguistics, looks not only at overt content but at form, cadences, patterns, and omissions. What a computer in this process does is no different from what analysts may spend hours for each patient doing. Jaffe feels the addition of computerized principles to psychiatry would eliminate much of the time-consuming work being done. This would shorten the period of analysis, and would bring the help offered by the psychiatrists into the reaches of many more people.

The notion of providing an extension of the psychiatrist by the addition of computerized techniques can be carried one step further to support the idea that computer techniques will also extend the counselor and allow him to serve more people adequately.

---

[22] Flora Schreiber and Melvin Herman, "The Computer Age in Psychoanalysis," Science Digest (January, 1965), pp. 18-19.

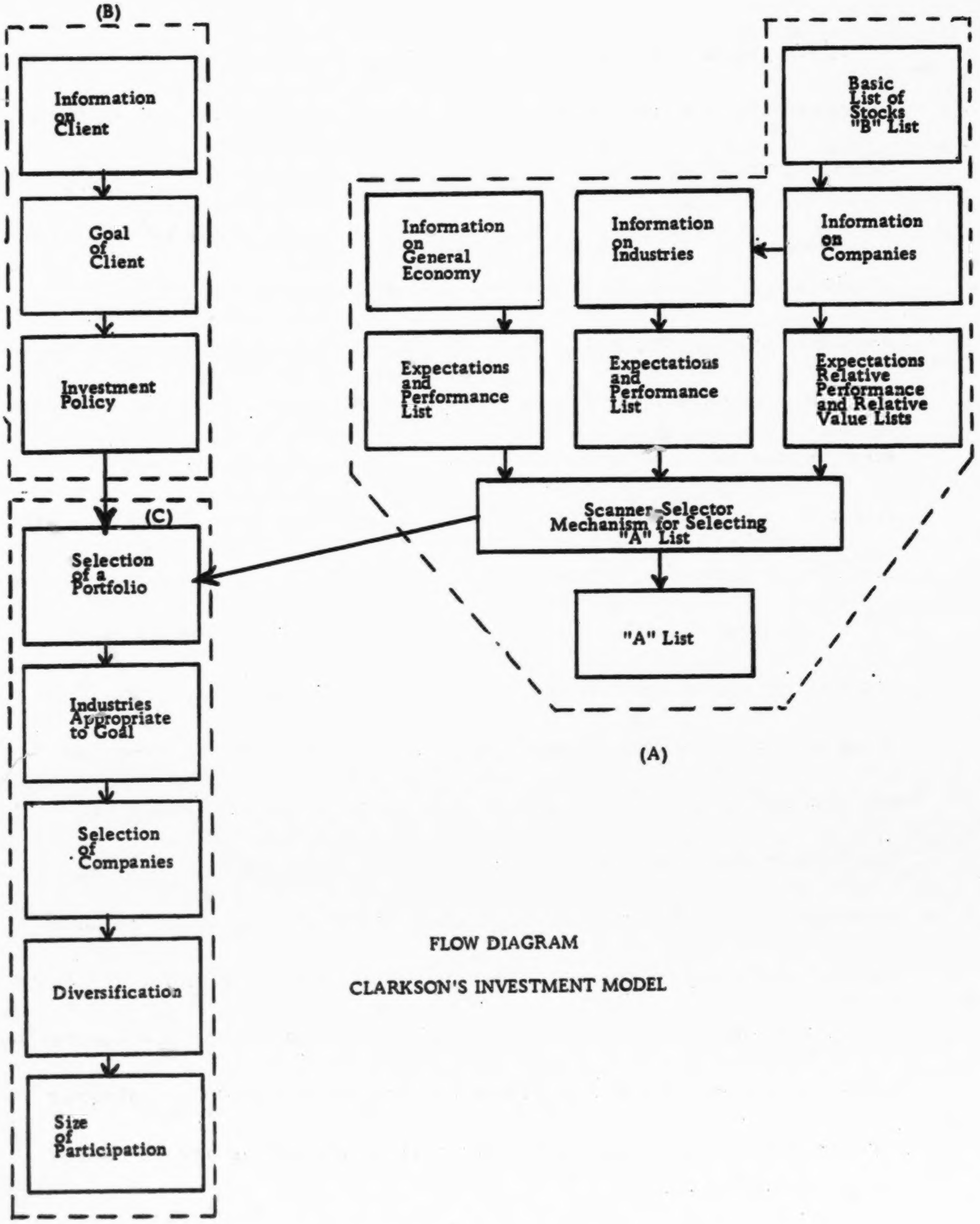
A program was written by Clarkson[23] to simulate the selection process an investment broker goes through in selecting stocks for his client's portfolio. Certainly the work of a stock broker is not directly related to psychology or education. However, the steps and the logic employed in the selection process by the computerized investor parallels closely the program of the automated counseling system.

It may be useful to look at a flow diagram of Clarkson's investment model for the purpose of comparison with the automated counseling system (see the following page). The flow diagram for the automated counseling system may be found on page 41 of Chapter Three.

Section (A) in the trust investment model is analogous to the student appraisal section of the automated counseling system. The investment model determines the nature of the economy, whereas the counseling model determines the nature of the academic world and the student's performance in it. The investment process in section (B) analyzes goals and policies of the client, while the automated counseling system analyzes the student's plans and aspirations during the automated interview. The (C) process in the investment model, the actual selection of stocks, has no completely analogous computerized component in the automated counseling system. For

---

[23] E. A. Feigenbaum and J. Feldman, op. cit., pp. 347-371.


(B)
Information on Client
Goal of Client
Investment Policy
(C)
Selection of a Portfolio
Industries Appropriate to Goal
Selection of Companies
Diversification
Size of Participation
Basic List of Stocks "B" List
Information on General Economy
Information on Industries
Information on Companies
Expectations and Performance List
Expectations and Performance List
Expectations Relative Performance and Relative Value Lists
Scanner-Selector Mechanism for Selecting "A" List
"A" List
(A)

FLOW DIAGRAM

CLARKSON'S INVESTMENT MODEL

Figure 1

the course selection is done by the student, with the computer intervening only when an inappropriate selection has been made.

The results of test portfolios have been promising. For four clients the model investor chose 2540 shares of stock. The automated investing system chose a similar number with 2145 of the shares exactly the same as the model investor. This is an agreement of 84% with no attempt to determine if the machine made better or worse selections than the human model.

It may be concluded, on the basis of these studies, that simulation of a process, such as educational planning, is possible with a high degree of accuracy.

CHAPTER III

PROCEDURES

Overview

Introduction

The purpose of this chapter is to describe the procedures used in determining the validity of the automated counseling system. However, for purposes of perspective it is important to: (1) summarize the objective of the larger research program of which this study is a part; (2) outline the development and current specifications of the automated counseling system. These two tasks will be completed prior to discussing the procedures which are employed in this study.

Summary of Problems and Objectives

The problem of this study is the validity of a computer-based counseling system, and the general objective is to determine the validity of this automated system. The specific objectives involved: (1) determining the agreement between the automated system and the model counselor in regard to pre-interview pupil appraisal, post interview pupil appraisal, educational decisions and completeness of educational plans; (2) determining the agreement between the automated system and the second counselor in regard to pre-interview pupil appraisal, post interview pupil appraisal, educational decision, and completeness of educational plans; (3) comparing the differences of those students counseled by the machine and the second counselor regarding pre-interview pupil appraisal, post interview pupil appraisal, educational decisions, and completeness of educational plans; and (4) identifying the specific limitations of the computer-based counseling system in regard to machine limitations, attention span, lack of reinforcers, lack of sensitivity, lack of student cooperation with the machine, and reservations about course plans. In terms of the specific objectives the following three major hypotheses are tested: (1) the automated counseling system will not be significantly different from the model counselor regarding pre-interview pupil appraisal, post-interview pupil appraisal, educational decisions, and completeness of educational plans; (2) the automated counseling system will not be significantly different from the second counselor regarding pre-interview pupil appraisal, post-interview pupil appraisal, educational decisions, and completeness of educational plans, and (3) the extent of agreement between the automated system and the model counselor will not be significantly different from the extent of agreement between the automated system and the second counselor regarding pre-interview pupil appraisal, post-interview pupil appraisal, educational decisions, and completeness of educational plans.

The Objectives of the Larger Research Program

The concept of an automated counseling system was developed initially by Cogswell and Loughary.[1] The project of developing an automated counseling system to be implemented in educational planning of secondary students is part of a larger research program. The larger research program is investigating the use of man-machine systems in automated school systems. Automated school systems would use computer-based programs for individual and group instruction, counseling, storage of school data, aid in decision-making situations, and administrative and clerical functions.

Specifications of the Automated Counseling System

Summary of Development

In order to better understand this particular study concerning the validation of the automated counseling system, some background information about the development of this system may be helpful. After the initial preliminary study (described in the Background and Rationale section of Chapter One) indicated the development of an automated counseling system was feasible, the plan of operation was developed. The plan had four phases: (1) identifying the rules used by the counselor in assessing the student during the pre-interview examination of the student's cumulative folder, and reducing these rules to a format that could be programed for a computer; (2) identifying the rules used by the counselor during the actual interview, and constructing the machine interview format in a manner compatible with computerization; (3) translating the pre-interview and interview format into machine language; and (4) the process of analysis and comparison of the automated system to human counselors in interviewing situations to determine the validity of the automated instrument.

---

[1] University of Oregon Conference held Spring, 1963.

Specifications of the Automated Counseling System

Introduction. The counselor chosen as the model for the system (a detailed description of the counselor selection procedure is found on pages 6-7, Chapter One) was asked to select twenty-five students, all in the ninth grade, with whom he had not counseled prior to this study, for an educational planning interview. The students selected were to represent, in the counselor's estimation, the range of students typical of this junior high school. He recorded his pre-interview behavior for each of these students, i.e., verbalized his thought as he studied each cumulative folder, and tape-recorded a typical educational planning interview for each student.

Typescripts were made of these recordings and then examined by the research team (see footnote number 6, Chapter One for members of the team). Flow charts describing the procedures involved were prepared for each typescript. Flow charts and typescripts themselves were examined intensively by the researchers for the purpose of identifying rules which the counselor employed.

The diagram on the following page describes the system which has been designed. It can be seen that there are two primary outcomes towards which the program is working. These are labeled "A" and "B" in the diagram. Outcome "A" is a computer program which analyzes the cumulative folder data for students in terms of educational planning objectives. Outcome "B" is a computer program which in essence is an automated interview for the student, again in regard to educational planning. Before continuing with the description of the proposed project it may be helpful to comment briefly on the system as displayed on the flow chart.

The diagram indicates that the first step in the system is to collect pupil appraisal data. These data are traditionally found in the student's cumulative folder. The next step is to code and store the data in a computer. Next, the computer analyzes the data according to rules used by the computer. Following this analysis the computer determines whether or not the student is ready for the

SYSTEM DIAGRAM OF AN AUTOMATED COUNSELING SYSTEM FOR EDUCATIONAL PLANNING

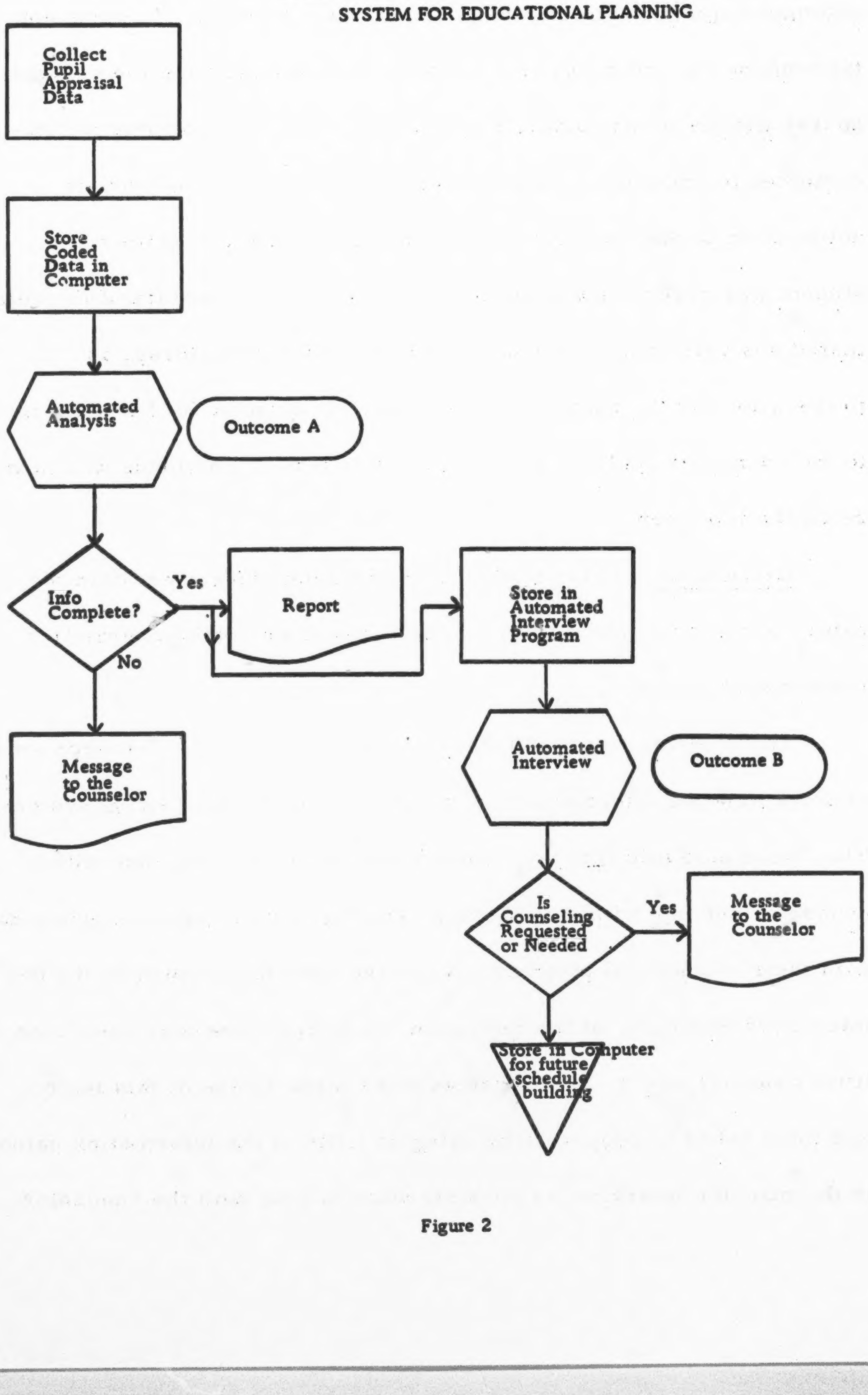

Collect Pupil Appraisal Data
Store Coded Data in Computer
Automated Analysis
Outcome A
Info Complete?
Yes
No
Report
Store in Automated Interview Program
Message to the Counselor
Automated Interview
Outcome B
Is Counseling Requested or Needed
Yes
Message to the Counselor
Store in Computer for future schedule building

Figure 2

automated interview in regard to educational planning. In the event the student was not ready (for example, he may not have the current course grades in his folder, which would make it impossible for the computer to make educational success predictions), appropriate notification to the counselor is made. If it were determined the student was ready for the automated interview, the results of the automated analysis of the cumulative folder are fed into storage in preparation for the automated interview. It is possible that a report to the counselor could be generated at this time. The focus will next be on the interview.

Orientation. Prior to the interview each student was told the nature of the study and was given instructions on how to operate the input-output device.

The students were told that they were helping in a research study to determine the effectiveness of a computerized interviewing system. They were also told that they would have two interviews, one with a counselor and one with the machine, and that both interviews would deal with their educational planning. Since the time lapse between the two interviews was only, at the minimum, 24 hours there may have been little wear-off effect. The students were made aware of this factor, and were asked to cooperate by using as little of the information gained in the machine interview as possible when talking with the counselor.

The input-output device is similar in operation to a typewriter. The students were informed how to enter their responses and how to signal for help with any operational difficulties that may arise during the machine interview.

The Interview. The automated counseling interview consisted of the student interacting with the computer according to a branching-type program designed to perform the functions performed by the model counselor.

The student interacted with the computer by means of equipment already available to Systems Development Corporation. The equipment that was used was an IBM Q-32, a computer located at Systems Development Corporation in Santa Monica, and the TWX--model 33, an input-output device located in Palo Alto. A telephonic circuit permitted communication between the two pieces of hardward in Palo Alto and Santa Monica.

The goal of this simulated interview was to have a student select his tenth grade courses and make tentative selections for the eleventh and twelfth grades. During the interview the input-output device automatically wrote out instructions to the student. If the instructions were of a multiple-choice nature the student responded by depressing one key, A to E, for example, in the case of a five-choice response. At other times the student was requested to type a short sentence when individual expression is necessary. Typing accuracy on the part of the student was important only when one exact key was depressed as in the multiple-choice items. The format of the machine interview, which was taken from the rules extracted from the counselor's interviews, is reproduced in Appendix A.

Machine Functions. The student selected courses based on his goals and preferences. The appropriateness of these selections were based in part upon the type of college the student planned to attend -- which he indicated during the machine interview -- whether or not he planned to attend college, his present GPA, and the minimum requirements for graduation from high school. If the student planned to attend a specific type of college but didn't take enough special units the machine informed him of this deficiency. If the student planned to go to college and had very low grades, or didn't plan to go and had high grades the machine told him he was setting his sights a little high or a little low. The GPA was used to determine the number of solids (homework courses) he should enroll for, and whether he would be permitted to take certain advanced courses. The student was not informed of these rules unless he made an inappropriate choice. The program stated the courses required for each grade, however, before the student selected the remaining courses.

Termination. During the automated counseling interview but before being asked if the selected courses are the final choices, the student had the opportunity to request an appointment with the counselor for further counseling. If he did not make the request, he was asked if he was satisfied with the high school course program he had selected. If he was satisfied, these choices were then stored in the computer in preparation for student schedule building. If he was not satisfied, he was either allowed to change his course program or he would receive an automatic referral to the counselor.

Procedures

General Design

The validity of the automated counseling system was determined by comparing the results of the automated system with those obtained through a regular interview with a counselor in regard to educational planning. The criterion that was used is whether or not the differences between the automated system and the counselor, in terms of the specific objectives, are significant. The statistical design employed in comparing the counselors with the automated system is a Type I design using the latin square; and the comparison between the model counselor-machine and the second counselor-machine groups is by a simple randomized design.

Sample

A sample of forty ninth grade students was drawn at random from Wilbur Junior High School in Palo Alto, California. The students attending Wilbur are a high ability, middle socio-economic population. A student placing in the 50th percentile on the School and College Aptitude Test at Wilbur Junior High School would be in the 70th percentile on national norms. This particular population is appropriate in that the automated counseling system was developed from observations of a counselor in that school district working with data from that district. The automated system was developed from a specific counselor working in a specific school environment with a particular system of appraisal data. To test the automated system using another school environment would introduce factors for which the computerized system has not been programed.

Treatment of the Population

Forty students were randomly divided into two groups of twenty students. Both groups had an interview with the automated counseling system. Group I also had an interview with the model counselor, and Group II had an interview with the second counselor. In order to combat the effect of temporal positioning of the interviews, such as always having the machine interview first, half of Group I and Group

II was counseled first by the machine, and the other half first by the counselor.

The first task in data analysis is to determine how well the automated system simulates the outcomes of the model counselor. In Group I (see the diagram on the following page) the results of the automated interviews from both subgroups are compated with results from the counselor's interview.

The second task is to determine how well the automated counseling system simulates the outcomes of the second counselor. In Group II the results of the automated interview from both subgroups are compared with the results from the counselor's interviews.

The third task is to determine if the amount of agreement between the automated system and the model counselor was significantly different from the amount of agreement between the automated system and the second counselor. This is done by comparing the amount of agreement between the two counseling modes in Group I with those of Group II.

The fourth task is to determine the effects of temporal positioning of the counselors in relation to the machine interview. Before the hypotheses related to the first three tasks could be accepted it was necessary to determine if the order in which the counseling modes were presented effected the outcomes. If the differences between

TREATMENT SCHEDULE

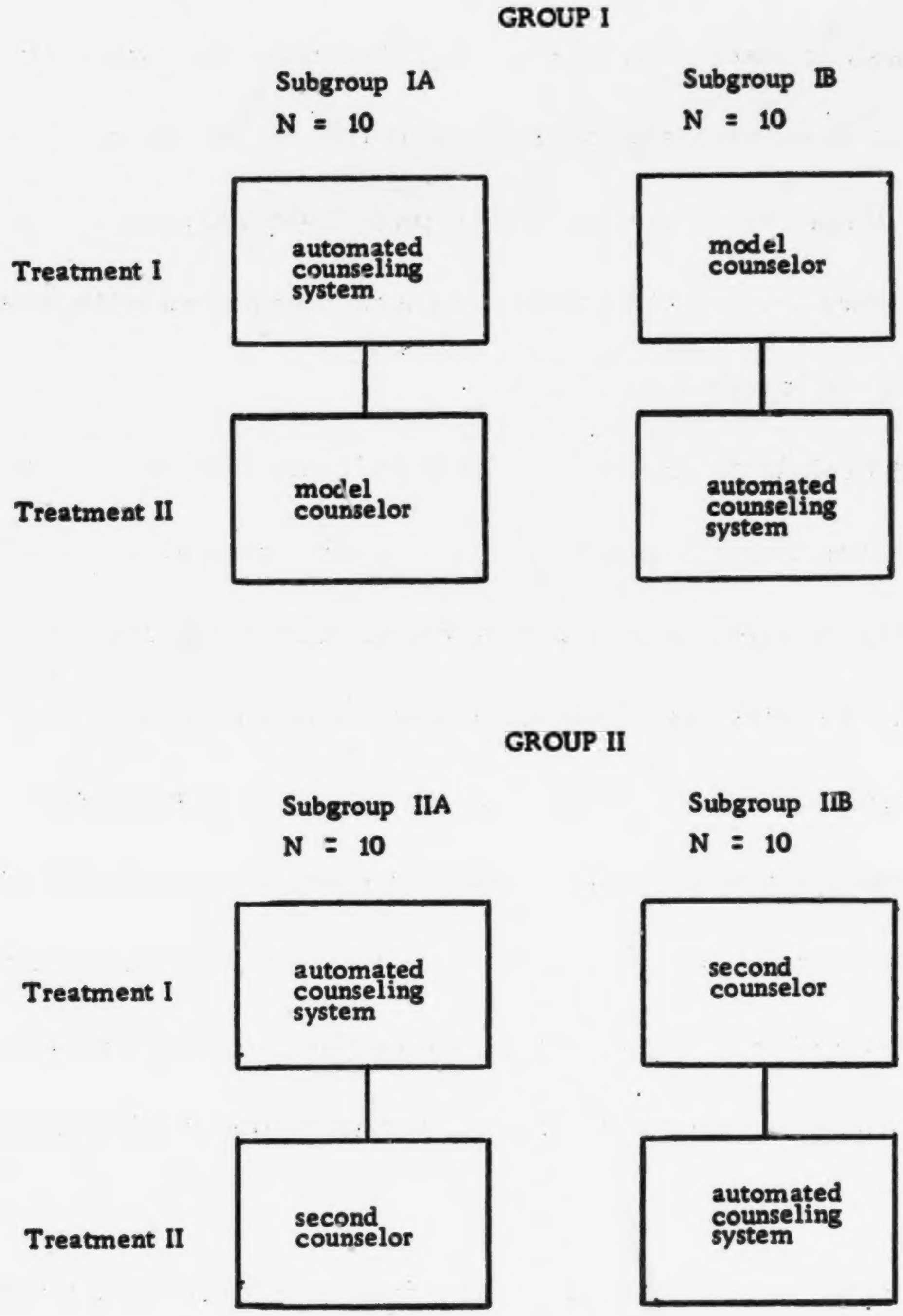

GROUP I
Subgroup IA
N = 10
Subgroup IB
N = 10
Treatment I
automated counseling system
model counselor
Treatment II
model counselor
automated counseling system
GROUP II
Subgroup IIA
N = 10
Subgroup IIB
N = 10
Treatment I
automated counseling system
second counselor
Treatment II
second counselor
automated counseling system

Figure 3

II was counseled first by the machine, and the other half first by the counselor.

The first task in data analysis is to determine how well the automated system simulates the outeomes of the model counselor. In Group I (see the diagram on the following page) the results of the automated interviews from both subgroups are compated with results from the counselor's interview.

The second task is to determine how well the automated counseling system simulates the outcomes of the second counselor. In Group II the results of the automated interview from both subgroups are compared with the results from the counselor's interviews.

The third task is to determine if the amount of agreement between the automated system and the model counselor was significantly different from the amount of agreement between the automated system and the second counselor. This is done by comparing the amount of agreement between the two counseling modes in Group I with those of Group II.

The fourth task is to determine the effects of temporal positioning of the counselors in relation to the machine interview. Before the hypotheses related to the first three tasks could be accepted it was necessary to determine if the order in which the counseling modes were presented effected the outcomes. If the differences between seeing the counselor first and seeing the machine first were significant even though the differences between treatments were not, it could not be assumed the machine was simulating the counselor. The effects of position for those students seeing the model counselor is determined by the agreement between the automated system and the counselor within subgroup IA, compared with the agreement within IB. The effects for the student seeing the second counselor are analyzed in the same manner using subgroups IIA and IIB. The total effect of positioning are determined by combining subgroups IA and IIA and comparing them with subgroups IB and IIB.

These four tasks are studied in terms of the specific objectives 1 and 2 on page 13 in Chapter One.

A fifth task is to determine some possible limitations of an automated counseling system (see specific objective 4, page 14 Chapter One). All forty students are considered as one group when studying this task.

Data Collection

Data Collected

The Automated Counseling System and the Model Counselor.

1. Pre-interview Pupil Appraisal. Two types of appraisal statements were collected from an analysis of the student's

cumulative records: (1) a statement concerning the student's predicted high school GPA based on a follow-up study involving students from the Palo Alto Unified School District; and (2) statements relating to the student's academic status, potentials, and problems based on counselor rules developed in the preliminary study.

The first type of pupil appraisal was stated in terms of contingency statements. After analyzing the student's cumulative folder, which was done just prior to the automated counseling interview, the computer printed out statements regarding the probability of a student earning a GPA of 2.00 or less, 2.00-2.49, 2.50-2.99, 3.00-3.49, and 3.50-4.00 in high school. The predictions about the student were on the basis of eleven decile groups -- zero out of ten chances to ten out of ten chances.

Prior to the counseling interview the counselor made a similar group of statements concerning GPA (see page 170, Appendix B, for the forms to be used to collect these data). The second type of statement, based on rules taken from the model counselor's pre-interview behavior during the rule-building phase of the study, was responded to by the machine and the counselor. A check list of fourteen statements relating to the student's present and future adademic status (see page 171, Appendix C) was collected from the counselor after he had indicated which statements applied to the student. The computer, after examining the cumulative record, printed out which statements from the list of fourteen applied to the student.

The data that were collected were the predicted GPA and the appraisal statements which apply to the student from both the machine and the counselor.

2. Post-interview Pupil Appraisal. During the interview the counselor evaluated the realism of the student's appraisal of his own ability, his plans after high school, and his course selections (see Appendix D). The computer also printed out a similar group of statements. Both the statements from the counselor and the computer were collected.

3. Educational Decisions. After each interview, one with the machine and one with the counselor, the student selected his courses. The student's course schedule after each interview was collected. The course schedule generating from the machine interview was a machine print-out listing by title the courses planned for high school. The schedule from the counselor's interview was a form on which the student has placed his courses by title for high school (see Appendix D for student's course schedule blank).

4. Completeness of Educational Plans. The outcomes of both the automated and counselor interviews were the course plans of the student. Most of the students made total plans for their high school

courses. Others made partial plans but could not decide what courses to take for the remainder. And there were some students who were unable to select courses at all.

The number of students who had complete course plans, the number who had partial course plans, and the number who had no plans at all, were collected for each of the two interviewing modes.

The Automated Counseling System and the Second Counselor. To be practically useful, the automated counseling system must not only simulate the outcomes of a model counselor, but must also closely approximate what other expert counselors in the same school district are doing. For the purposes of determining the extent to which a computerized system, based on one model counselor, could be used in a school district with many counselors, a second counselor from the model counselor's district was included in the study.

The data collected for Group II were the same as that collected for Group I in regard to the following:

1. Pre-interview Pupil Appraisal,
2. Post-interview Pupil Appraisal,
3. Educational Decisions, and
4. Completeness of Educational Plans.

The Comparison of Group I with Group II. After all data for Group I and Group II had been collected and analyses made for each group, the two groups were compared by determining the degree to which the automated counseling system produced results comparable to each of the two counselors.

1. Pre-interview Pupil Appraisal. The data that was collected was the same as that collected for the independent analysis of Group I and Group II except that subgroup IA was combined with IB and IIA with IIB.

2. Post-interview Pupil Appraisal. The data that was collected was the same as that collected for the independent analysis of Group I and Group II except that subgroup IA was combined with IB and IIA with IIB.

3. Educational Decisions. The combined scores of IA and IB was collected and was compared with the combined scores of IIA and IIB in terms of educational decisions.

4. Completeness of Educational Plans. The combined scores of subgroups IA and IB and the scores of IIA and IIB relating to the degree to which students had made total course plans, partial course plans, and no course plans was collected.

Specific Limitations of the Computer-based Counseling System. There are some qualities which may exist in the relationship between two individuals, such as in a regular counseling interview, that may be partially or wholly lacking in the machine interview. Since the student was having the machine interview, some of the possible weaknesses were apparent to him. The data collected was from analysis of interview performance and comments from the students at the close of the interview.

1. Machine Limitations. The students who were unable to make total course plans were asked these questions: (a) Was your inability to make total course plans a result of the machine not presenting the material clearly? and (b) Did you feel the machine did not give you enough information to make adequate choices?

2. Attention Span. The number of students who terminated the interview early were collected. Also, each student was asked if the interview bored him or caused him to be restless.

3. Lack of Reinforcers. The students were asked if they felt the machine not informing them about whether their response to each item was good or poor made it more difficult to make selections. They were also asked if the lack of the presence of a counselor adversely affected their decision-making.

4. Lack of Sensitivity to the Student's Needs and Orientation towards Counseling. The students were asked if the machine interview met their needs in terms of high school course planning, and if it met their expectations of what an educational planning interview should be.

5. Lack of Student Cooperation. The number of students who attempted to jam the machine and the number of students who wrote in ridiculous responses were collected.

6. Reservations About Course Plans. The number of students who had reservations about their courses chosen during the machine interview and during the counseling interview were collected.

How the Data were Collected

The Automated Counseling System and the Model Counselor.

1. Pre-interview Pupil Appraisal. At the end of the pre-interview analysis, the computer printed out predictions concerning the student's high school GPA and appraisal statements relating to present and future academic status of the student. This print-out was collected.

The counselor will make a similar analysis by completing the forms shown in Appendix B and C. These forms were collected after the counselor had analyzed the student's cumulative record.

2. Post-interview Pupil Appraisal. The computer printed out data relating to the realism of the student's plans and choices. This print-out was collected.

The counselor completed a form (Appendix D) giving similar data, which was collected after the interview.

3. Educational Decisions. After the machine interview the machine printed out the student's course schedule. After the interview with the counselor the student completed, in writing, a course schedule. These two schedules were collected.

4. Completeness of Educational Plans. An analysis of the student's course schedule showed if he had made total, partial, or no course plans. The course schedule planned after the interview with the counselor indicated total, partial, or no planning.

The Automated System and the Second Counselor. The data were collected in the same manner for Group II as was used for Group I in terms of:

1. Pre-interview Pupil Appraisal,
2. Post-interview Pupil Appraisal,
3. Educational Decisions, and
4. Completeness of Educational Plans.

The Comparison of Group I with Group II.

1. Pre-interview Pupil Appraisal. The method used in collecting the data was the same as the method used for the machine and the model counselor and the machine and the second counselor analyses.

2. Post-interview Pupil Appraisal. The method used in collecting the data was the same as the method used for the machine and the model counselor and the machine and the second counselor analyses.

3. Educational Decisions. The same procedure was followed in collecting the data for educational decisions was used for pupil appraisal data.

4. Completeness of Educational Plans. The same collection procedures was used as for the collection of pupil appraisal data.

Specific Limitations of the Computer-based Counseling System.

1. Machine Limitations. These questions were asked in a short structured interview at the close of the machine interview. The questions asked were included in a more lengthy structured interview, which was given by another researcher investigating another problem in regard to the automated counseling system. Rather than have two structured interviews, the few questions necessary for this study were included in the interview of the other researcher (see Appendix F for the questions pertaining to machine limitations).

2. Attention Span. An analysis of the machine interview indicated if the student terminated early, since the print-out of the machine interview would not be complete. The question regarding boredom was asked in a structured interview at the end of the machine interview.

3. Lack of Reinforcers. These questions were asked in a structured interview.

4. Lack of Sensitivity to the Student's Needs and Orientation towards Counseling. These questions were asked in a structured interview.

5. Lack of Student Cooperation. An analysis of the interview print-out showed those who tried to jam the machine or who typed in inappropriate responses. The number of students involved in either of these activities was recorded.

6. Reservations About Course Plans. The form on which the students entered their high school course plans during the counselors' interview contained a question which asked if they had any reservations about these course plans. During the structured interview which followed the interviews of both counseling modes the students were asked if they had any reservations about their courses chosen during the machine interview. The number of students who indicated reservations about course plans selected during either interviewing mode was recorded.

Data Analysis

The analysis of the data is done by using a Type I design. This consists of using a latin square (see below)

	A1	A2
B1		
B2		

in which A = Treatment, A1 = Machine and A2 = Counselor; and B = Order, B1 = Machine interview first and B2 = Counselor's interview first. A Type I design is important in that it counterbalances the effects of the temporal positioning of the treatment orders (B1 and B2). This design makes it possible not only to study the effects of ordering upon the treatments but also the interaction of ordering and treatments.

The analysis of the total sum of squares is as follows:

SSt=SSs + SSws

SSt=SSb + SSwb + SSws

SSt=SSa + SSs + SSas

SSt=SSa + SSb + SSab + SSw cells

The extent to which the machine (A1) simulated the counselor (A2) is determined by whether or not the F=MSa/MSerror (w) is significant.

Similarly, the effects of ordering upon the two treatment modes are tested by determing if F=MSb/MSerror (b) is significant.

The interaction effect between the treatments and order, A and B, is determined by F=MSab/MSerror (w). If the difference is significant the particular combination of treatment and order had effected the outcomes.

The F ratio is considered significant at the .05 level for all analyses.

The Automated Counseling System and the Model Counselor

Pre-interview Pupil Appraisal. The probability statements relating to GPA were made in the form of how many chances out of ten the student has for reaching a specific GPA in high school. For the criterion measure, GPA, there were eleven categories -- zero out of ten to ten out of ten chances. The category in which the student has the greatest number of chances was selected to represent the appraisal of the student, and its number, one to eleven, was placed in the latin square. If there were two equal larger numbers of chances the means of the two categories were used.

Students in subgroup IA had their scores placed in the A1B1 square (of the latin square) for the machine interview and in A2B1 for the counseling interview. Student scores in subgroup IB were placed in square A1B2 for the machine interview and A2B2 for the counseling interview.

This data are analyzed to determine if the F ratio between the machine and the counselor was significant.

In the analysis of appraisal statements concerning the student's present and future academic status a value of one was assigned if the statement applied to the student and a value of two if it did not. A separate analysis was done for each of the fourteen statements.

Students in subgroup IA had their scores (the value assigned to the statement) placed in the A1B1 square for the machine interview and in the A2B1 square for the counseling interview. Student scores in subgroup IB were placed in square A1B2 for the machine interview and A2B2 for the counselor's interview.

Post-interview Pupil Appraisal. Statements relating to how realistically the student views himself (see Appendix D) were assigned a value of one if the answer of yes was given to the statement and a value of two if the answer was no. A separate analysis is done for each of the five statements.

Students in subgroup IA had their scores (the value assigned to the statement) placed in square A1B1 for the machine interview and in A2B1 for the counseling interview. Student scores in subgroup IB were placed in square A1B2 for the machine interview and A2B2 for the counselor's interview.

Educational Decisions. The criterion measure is the differences between the courses selected by the student when counseled by the machine and when counseled by a counselor. The courses selected by the counselor are considered the basis for comparison.

Since the courses selected after being interviewed by the counselor were for the basis of comparison, each student in subgroup IA had the total number of courses selected after the counseling interview placed in square A2B1. The number of courses selected during the machine interview which agree with the course titles selected during the counseling interview was placed in square A1B1. For example, if the student selected three courses after each of the two interviewing modes but only two of the course titles selected during the machine interview matched those selected during the counseling interview, the number three was placed in square A2B1 and the number two was placed in square A1B1. The same procedure applied for subgroup IB except for using squares A1B2 and A2B2. If the differences are not significant this indicates the actual courses selected for both interviewing modes are the same. A separate analysis is done for tenth, eleventh, and twelfth grades.

When there are differences between the two interviews an attempt is made to determine if the differing courses fall into a specific pattern or category of courses. The courses are divided into three categories: (a) special unit courses -- special college entrance requirements; (b) non-special unit solids -- homework type courses; and (c) elective courses. The percentage of changing from one catagory to another, from a solid to a special unit, from an elective to a special unit, etc., was calculated. An analysis is also done to determine if course changes were made in the same subject area or if students changed from one area to another.

Completeness of Educational Plans. The analysis involved the number of students making total course plans, the number making partial course plans, and the number making no course plans. The student was assigned a score of 1 if he had made total plans, a score of 2 for partial plans, and a score of 3 for no plans. The scores for students in IA for the machine interview are placed in square A1B1 and for the counseling interview in A2B1. Subgroup IB is treated similarly using squares A1B2 and A2B2. The same procedure is repeated for the other three criterion measures. A separate analysis is done for the tenth, eleventh and twelfth grades.

If the differences between the two interviewing modes are significant at the .05 level for any of the three criterion measures a further analysis is done. This analysis attempts to investigate whether individual student differences, School and College Aptitude Test scores, sex, and socio-economic variables are responsible. Comparisons are made between males and females, upper and lower groups in regard to scholastic ability using the mean of national SCAT norms as the dividing point, upper and lower groups using the mean of local SCAT norms, and three socio-economic levels based on fathers occupation -- professional and managerial, semi-professional, and laborer. These analyses involve the same procedures as stated for the criterion measures with the exception of subgrouping the population to correspond with the factors tested. Group I and Group II are combined and treated as one group for those items in which no significant differences occurred between the model counselor and the second counselor.

The Automated System and the Second Counselor

The data analyzed and the procedures used in the analysis of the data for group II, those interviewed by the machine and the second counselor, are the same as for those interviewed by the machine and the model counselor -- Group I -- in regard to the following:

1. Pre-interview Pupil Appraisal,
2. Post-interview Pupil Appraisal,
3. Educational Decisions, and
4. Completeness of Educational Plans.

If the differences between the two interviewing modes are significant at the .05 level for any of the above four validity measures, a further analysis (see page 63, Chapter Three) is done.

The Comparison of Group I with Group II

The design used for the comparison of Group I with Group II is a simple randomized design.

The criterion measures that are used for the first analysis are the differences between the machine scores and the counselor scores used in the separate analysis of Group I and Group II. The deviation scores of Group I are compared to those of Group II. The second analysis combines the deviation scores of all those seeing the counselor first and comparing with those seeing the machine first.

The first analysis is done by combining subgroups IA and IB and comparing with IIA and IIb. This indicates the extent of agreement between the model counselor and the machine with the agreement between the second counselor and the machine disregarding the effects of order. Analyses are done for:

1. Pre-interview Pupil Appraisal,
2. Post-interview Pupil Appraisal,
3. Educational Decisions, and
4. Completeness of Educational Plans.

The analysis of each item in these four validity measures yields a single F ratio. If the F is significant for that item then the difference between the machine and the counselor is not attributable to chance.

A second analysis is done to determine if the students who saw the counselor first had results that varied significantly from the results of the students who saw the machine first. In this case students from both counselors who had the machine interview first are combined and have their scores compared with the scores of the students who saw the counselor first. A single F ratio for each item indicates if there are any significant effects on ordering for the sample population as a whole disregarding the effects of the two counselors. Analyses are done for:

1. Pre-interview Pupil Appraisal,
2. Post-interview Pupil Appraisal,
3. Educational decisions, and
4. Completeness of Course Plans.

Machine Limitations

1. Machine Limitations. The percentage of students who felt their inability to make total course plans was a result of the machine not presenting the material clearly, and the percentage feeling the machine did not give enough information for making adequate choices is calculated.

2. Attention Span. The percentage of the students who terminated the interview early and the percentage who said they were bored is calculated.

3. Lack of Reinforcers. The percentage of students who felt not having the machine inform them as to whether an answer or response was good or poor made it difficult to select a course program, and the percentage who felt the lack of presence of the counselor caused them to be unable to complete a course plan is computed.

4. Lack of Sensitivity to the Student's Needs and Orientation towards Counseling. The percentage of students who felt that the machine interview met their needs in terms of high school course planning and who felt the automated system met their expectations of what an educational planning interview should be is calculated.

5. Lack of Student Cooperation. The percentage of students who tried to jam the machine, and the percentage who wrote in ridiculous responses is computed.

6. Reservations about Course Plans. The percentage of students who had reservation about their course plans chosen during the counseling interview and the percentage who had reservations about their computer chosen course plans is computed.

CHAPTER IV

RESULTS

Introduction

This chapter reports the results of the procedures used in determining the validity of the automated counseling system.

The problem with which this study is concerned is the validity of an existing computer-based counseling system. The general objective is to determine the validity of this automated system. The specific objectives involve the following hypotheses.

1. The automated counseling system will not be significantly different from the model counselor regarding:
    - a. pre-interview pupil appraisal,
    - b. post-interview pupil appraisal,
    - c. educational decisions, and
    - d. completeness of educational plans.
2. The automated counseling system will not be significantly different from the second counselor regarding:
    - a. pre-interview pupil appraisal,
    - b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of educational plans.

3. The extent of agreement between the automated system and the model counselor will not be significantly different from the extent of agreement between the automated system and the second counselor regarding:

a. pre-interview pupil appraisal,

b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of educational plans.

To offset the effects of having the students consistently interviewed by one counseling mode before the other, i.e., the automated interview before the counselors' interview, half of the students were interviewed first by the machine and then by a counselor and half by a counselor first and then by the machine. Before any of the three hypotheses could be accepted it was necessary to determine if the lack of significant differences was related to the order of the interview modes or to interaction between the treatments and order.

In addition to testing the three major hypotheses specific limitations of the computer-based counseling system were investigated in regard to (1) machine limitations, (2) attention span, (3) lack of reinforcers, (4) lack of sensitivity, (5) lack of student cooperation with the machine, and (6) reservations about course plans.

The results are reported in the order in which the three major hypotheses are listed. Before the limitations of the computer-based counseling system are reported, further analyses using the results obtained in the testing of the three hypotheses and other relevant data are discussed. This involves the following analyses.

1. A comparison between the counselors and the machine using the number of students making total plans as the criterion measure.

2. A comparison between the experimentally chosen tenth grade course plans (those chosen during the machine and the counselors' interview) and the tenth grade courses for which the students officially registered two weeks following the collection of data.

3. A determination of the nature of course changes by comparing the courses selected during the counselors' interview with the courses selected during the machine interview for all three high school grades, the machine chosen tenth grade courses with final tenth grade courses, and the counselor chosen tenth grade courses with final tenth grade courses.

4. An analysis of the items which indicated significant differences between counselors and the automated counseling system

regarding sex, national and local School and College Ability Test norms, and family socio-economic level.

The significance level used in this study is .05. Any of the hypotheses were accepted if the differences were not significant beyond this level.

Results

The Automated Counseling System and the Model Counselor

Hypothesis 1. The automated counseling system will not be significantly different from the model counselor regarding:

a. pre-interview pupil appraisal,

b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of educational plans.

1-a. Pre-interview pupil appraisal. Prior to the actual course planning interview the model counselor and the machine predicted each student's high school GPA and made statements about students based on cumulative record folder data. Table 1 presents the analysis of these data.

The hypothesis that there would be no significant differences between the model counselor and the machine was accepted for the

TABLE 1

TABLE OF F'S FOR PRE-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
Predicted GPA	1	17	1.900	4.215	1.900	.248	4.45	9.810*
1. Student's grades have gone down quite a bit. Ask about this in interview--there may be personal problems	1	18	0	0	0	0	4.41	0
2. Student's grades have gone up. Ask about this in the next interview.	1	18	.025	1.450	.025	.081	4.41	.310
3. This student should be watched closely.	1	18	.025	4.250	.025	.236	4.41	.106
4. Student is a potential drop-out.	1	18	.900	2.100	.900	.117	4.41	7.712*
5. Should be headed for college--encourage student to explore widely in academic areas.	1	18	1.600	2.300	1.600	.128	4.41	12.320*
6. Low counseling priority. No problems apparent.	1	18	.100	1.900	.100	.106	4.41	.948
7. Student is getting better grades than one would predict from look at aptitude scores.	1	18	2.025	2.450	2.025	.136	4.41	14.879*
8. Student is not achieving as well as aptitude scores would predict.	1	18	.205	2.250	.025	.125	4.41	.200
9. Cumulative folder contains no aptitude scores for this student.	1	18	0	0	0	0	4.41	0
10. Look out for over ambitious plans.	1	18	.900	4.000	.900	.222	4.41	4.050
11. Student may need to strengthen quantitative skills or will probably experience academic difficulty.	1	18	0	1.600	0	.089	4.41	0
12. Student should improve verbal skills. If not, student may not be able to attain desired academic goals.	1	18	0	1.000	0	.056	4.41	0
13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.	1	18	1.600	2.300	1.600	.128	4.41	12.523*
14. Cumulative folder contains no grades for this student.	1	18	0	0	0	0	4.41	0

* significant beyond .05

following items. For these items the machine and the counselor appraised each student similarly.

Statement 1. Student's grades have gone down quite a bit. Ask about this in interview--there may be personal problems.

Statement 2. Student's grades have gone up. Ask about this in the next interview.

Statement 3. This student should be watched closely.

Statement 6. Low counseling priority. No problems apparent.

Statement 8. Student is not achieving as well as aptitude scores would predict.

Statement 9. Cumulative folder contains no aptitude scores for this student--try to get some.

Statement 10. Look out for over ambitious plans.

Statement 11. Student may need to strengthen quantitative skills or will probably experience academic difficulty.

Statement 12. Student should improve verbal skills. If not, student may not be able to attain desired academic goals.

Statement 14. Cumulative folder contains no grades for this student.

The hypothesis that there would be no significant differences between the model counselor and the machine was rejected for five items. Regarding the following five items the machine and the counselor did not appraise each student similarly.

Predicted high school GPA.

Statement 4. Student is a potential drop-out.

Statement 5. Should be headed for college--encourage student to explore widely in academic areas.

Statement 7. Student is getting better grades than one would expect from looking at aptitude scores.

Statement 13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.

The direction of the differences for these items were; the counselor predicted lower GPA's, saw fewer students as potential drop-outs, saw fewer college bound students who should explore widely academic areas, found fewer students getting better grades than aptitude scores would predict, and saw fewer cases of great disparity between aptitude scores and achievement than did the machine.

Since the pre-interview pupil appraisal was done prior to the interview there was no order or interaction effects to be tested.

1-b. Post-interview pupil appraisal. After each interview questions pertaining to the content of the interview (problems, plans, and appropriateness of plans) were answered by the counselor using a check list. Similar data from the machine were obtained by inspection of the interview print-out. The results of the data analysis are given in Tables 2, 3, and 4.

TABLE 2

TABLE OF TREATMENT F'S FOR POST-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	16	.444	2.445	.444	.153	4.49	2.902
2. Does the student indicate he is going to college?	1	18	.025	.450	.025	.025	4.41	1.000
3. Is he planning to take more solids than his GPA warrants?	1	18	.025	1.450	.025	.081	4.41	.311
4. On the basis of his projected grades and the type of college he is planning to attend is his planning realistic, aiming too high or aiming too low?	1	17	.138	3.290	.138	.194	4.45	.713
5. What is the student's proposed college major?	1	18	.900	2.100	.900	.117	4.41	7.712*

* significant beyond .05

TABLE 3

TABLE OF ORDER F'S FOR POST-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	B	Between Groups	B	Between Groups	B	Between Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	16	4.000	2.000	4.000	.125	4.49	32.000*
2. Does the student indicate he is going to college?	1	18	.225	2.050	.225	.114	4.41	1.975
3. Is he planning to take more solids than his GPA warrants?	1	18	.025	1.250	.025	.069	4.41	.360
4. On the basis of his projected grades and the type of college he is planning to attend is his planning realistic, aiming too high or aiming too low?	1	17	.336	3.888	.336	.229	4.45	1.469
5. What is the student's proposed college major?	1	18	0	2.100	0	.117	4.41	0

* significant beyond .05

TABLE 4

TABLE OF INTERACTION F'S FOR POST-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	AB	Within Groups	AB	Within Groups	AB	Within Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	16	.111	2.445	.111	.153	4.49	.725
2. Does the student indicate he is going to college?	1	18	.025	.450	.025	.025	4.41	1.000
3. Is he planning to take more solids than his GPA warrants?	1	18	.025	1.450	.025	.081	4.41	.311
4. On the basis of his projected grades and the type of college he is planning to attend, is his planning realistic, aiming too high or aiming too low?	1	17	.697	3.290	.697	.194	4.45	3.602
5. What is the student's proposed college major?	1	18	0	2.100	0	.117	4.41	0

The hypothesis of no significant differences between the model counselor and the machine was accepted for the following four questions.

Question 1. Does the student indicate he is having problems with his courses?

Question 2. Does the student indicate he is going to college?

Question 3. Is he planning to take more solids than his GPA warrants?

Question 4. On the basis of his projected grades and the type of college he is planning to attend (or not to attend college or trade school at all) is the student's planning realistic, aiming too high, or aiming too low?

The hypothesis was rejected for the following question.

Question 5. What is the student's proposed college major: business, engineering or one of the sciences, social science, language, music and art, education, or student is not college bound?

While on the basis of comparison between treatments (the model counselor versus the machine) there were no significant differences, the effect of the order of interview presentation was highly significant for Question 1. The students indicated significantly more problems with courses when the machine interview was first. Therefore, the hypothesis that there will be no significant differences between the model counselor and the machine regarding Question 1 must be rejected.

There were no significant order or interaction effects for any of the other items.

1-c. Educational decisions. Educational decisions consist of specific course selections made by the student during his interview with the counselor and the machine. The courses chosen during the counselor's interview were used as the basis for comparison with the machine interview. As explained in detail in Chapter 3, the comparative data represents the number of specific courses selected during the machine interview which agree with specific courses selected during the counselor's interview.

Only the students who completed at least partial course plans were compared. The variance caused by those students not making any course plans is determined in the section reporting the differences between the counselor and the machine in terms of completeness of course plans. Only the courses which involved decision-making were compared, i.e., the required courses were not compared.

As can be seen in Table 5 the hypothesis that there would be no significant differences between the model counselor and the machine regarding the specific courses selected for high school was accepted only for grade eleven.

The hypothesis was rejected for grades ten and twelve.

TABLE 5

TABLE OF TREATMENT F'S FOR HIGH SCHOOL COURSE PLANNING COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms.		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
10th grade course plans	1	18	3.625	6.650	3.625	.369	4.41	9.810*
11th grade course plans	1	11	.616	5.350	.616	.486	4.84	1.266
12th grade course plans	1	10	6.000	.314	6.000	.031	4.96	191.083*

---

* significant beyond .05

As shown in Table 6 there were no order effects.

There were, however, significant interaction effects between order and treatments for grades ten and twelve, as can be seen from Table 7. For the tenth grade the mean number of counselor selected courses for subgroup IA (machine first) was higher (3.6) than the mean for subgroup IB (counselor first) while the mean for machine selected courses for subgroup IA was lower (2.5) than the mean for subgroup IB (2.7). In other words, the extent of agreement between the counselor and the machine was greater when the counselor was first than when the machine was first. Further analysis showed the differences between the courses selected during the counselor's interview and those selected during the machine interview to be significant for subgroup IA, but not for subgroup IB. In regard to interaction for grade twelve, the mean for counselor selected courses for subgroup IA was higher (3.6) than the mean for subgroup IB (3.29) while the mean for the machine courses for subgroup IA was lower (2.2) than the mean for subgroup IB (2.57), thus indicating closer agreement between the counseling modes regarding subgroup IB than subgroup IA. Further analysis showed the differences between the courses selected during the machine interview for subgroup IA to be significant beyond the .05 level. For subgroup IB, the differences were also significant beyond the .05 level.

TABLE 6

TABLE OF ORDER F'S FOR HIGH SCHOOL COURSE PLANNING COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	B	Between Groups	B	Between Groups	B	Between Groups	Required at .05	
10th grade course plans	1	18	.225	11.250	.225	.625	4.41	.360
11th grade course plans	1	11	.312	10.150	.312	.923	4.84	.337
12th grade course plans	1	10	.005	19.829	.005	1.983	4.96	.003

TABLE 7

TABLE OF INTERACTION F'S FOR HIGH SCHOOL COURSE PLANNING COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	AB	Within Groups	AB	Within Groups	AB	Within Groups	Required at .05	
10th grade course plans	1	18	3.225	6.650	3.225	.364	4.41	8.738*
11th grade course plans	1	11	2.034	5.350	2.034	.486	4.84	4.182
12th grade course plans	1	10	.686	.314	.686	.031	4.97	21.847*

*significant beyond .05

Because of the manner in which these data were treated it was possible for the student to have selected five courses during the machine interview and three courses during the counselor's interview and have three of the five machine courses match, in terms of course title, the three counselor chosen courses. In analyzing the data the machine would appear better than it really was since the data summary would indicate that three courses chosen by the machine matched three courses chosen in the counseling interview when, in fact, three out of five courses matched the three counselor chosen courses. Even though the frequency and the magnitude of this phenomenon was very low, a percentage of agreement between the counselor and the machine, disregarding order, was determined by taking into consideration the number of courses selected during the machine interview, the number selected during the counselor's interview and the number identical courses selected during both interviews.

The percentage of agreement was 66 percent for the tenth grade courses, 65 percent for the eleventh grade courses and 53 percent for the twelfth grade courses.

1-d. Completeness of course plans. While each student was asked to complete a course plan for the tenth, eleventh, and twelfth grades, only part of the sample were able to do so. Others could make only partial plans, and some could make no plans at all. The students making total, partial, or no course plans during the machine interview were compared with the students making total, partial, or no course plans during the counselor's interview. Separate analyses were done for each grade level. The results are reported in Tables 8, 9, and 10.

The hypothesis that there would be no significant differences between the model counselor and the machine in terms of students making total, partial, or no course plans was accepted for the tenth and eleventh grades.

The hypothesis was rejected for the twelfth grade.

The machine did not successfully simulate the counselor regarding completeness of course plans for the twelfth grade. All the students seeing the counselor were able to make at least partial course plans while 40 percent of the students were unable to make any course plans at all during the machine interview.

There were no significant order or interaction effects.

The Automated Counseling System and the Second Counselor

If the automated counseling system is to have practical use in a school setting it must not only simulate the counselor after whom it was modeled, but the automated system should also produce results similar to those of other counselors working with the same students

TABLE 8

TABLE OF TREATMENT F'S FOR COMPLETENESS OF COURSE PLANS COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
Completeness of 10th grade course plans	1	18	.025	1.450	.025	.081	4.41	.310
Completeness of 11th grade course plans	1	18	.900	10.000	.900	.556	4.41	1.619
Completeness of 12th grade course plans	1	18	3.025	10.450	3.025	.581	4.41	5.207[*]

[*] significant beyond .05

TABLE 9

TABLE OF ORDER F'S FOR COMPLETENESS OF COURSE PLANS COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	A	Between Groups	B	Between Groups	B	Between Groups	Required at .05	
Completeness of 10th grade course plans	1	18	.225	1.050	.225	.058	4.41	3.857
Completeness of 11th grade course plans	1	18	.400	8.200	.400	.456	4.41	.877
Completeness of 12th grade course plans	1	18	.625	11.650	.625	.647	4.41	.966

TABLE 10

TABLE OF INTERACTION F'S FOR COMPLETENESS OF COURSE PLANS COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE MODEL COUNSELOR

Analysis Item	df		ss		ms		F	F
	AB	Within Groups	AB	Within Groups	AB	Within Groups	Required at .05	
Completeness of 10th grade course plans	1	18	.025	1.450	.025	.081	4.41	.310
Completeness of 11th grade course plans	1	18	.100	10.000	.100	.556	4.41	.180
Completeness of 12th grade course plans	1	18	.025	10.450	.025	.581	4.41	.043

and using the same data. This section determines the agreement between the automated counseling system and a second counselor from the same school district as the model counselor. Data collection and analyses procedures employed are the same as for the automated system versus the model counselor.

Hypothesis 2. The automated counseling system will not be significantly different from the second counselor regarding:

a. pre-interview pupil appraisal,
b. post-interview pupil appraisal,
c. educational decisions, and
d. completeness of educational plans.

2-a. Pre-interview pupil appraisal. The hypothesis that there would be no significant differences between the automated counseling system and the second counselor was accepted for the following items as can be seen in Table 11. For these items the machine and the counselor appraised each student similarly.

Predicted high school GPA.

Statement 1. Student's grades have gone down quite a bit. Ask about this in interview--there may be personal problems.

Statement 2. Student's grades have gone up. Ask about this in the next interview.

TABLE 11

TABLE OF F'S FOR PRE-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Items	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
Predicted GPA	1	14	2.532	10.466	2.532	.748	4.60	3.387
1. Student's grades have gone down quite a bit. Ask about this in interview--there may be personal problems.	1	18	.025	.450	.025	.025	4.41	1.000
2. Student's grades have gone up. Ask about this in the next interview.	1	18	.025	.425	.025	.024	4.41	1.059
3. This student should be watched closely.	1	18	.025	1.850	.025	.103	4.41	.243
4. Student is a potential drop-out.	1	18	.625	1.850	.625	.103	4.41	6.080*
5. Should be headed for college--encourage student to explore widely in academic areas.	1	18	0	1.600	0	.089	4.41	0
6. Low counseling priority. No problems apparent.	1	18	.625	1.250	.625	.069	4.41	9.001*
7. Student is getting better grades than one would predict from look at aptitude scores.	1	18	.900	3.700	.900	.206	4.41	4.377
8. Student is not achieving as well as aptitude scores would predict.	1	18	0	1.900	0	.106	4.41	0
9. Cumulative folder contains no aptitude scores for this student.	1	18	0	0	0	0	4.41	0
10. Look out for over ambitious plans.	1	18	.500	3.500	.500	.144	4.41	2.571
11. Student may need to strengthen quantitative skills or will probably experience academic difficulty.	1	18	0	1.600	0	.009	4.41	0
12. Student should improve verbal skills. If not, student may not be able to attain desired academic goals.	1	18	0	.900	0	.050	4.41	0
13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.	1	18	.900	2.900	.900	.161	4.41	5.586*
14. Cumalative folder contains no grades for this student.	1	18	0	0	0	0	4.41	0

* significant beyond .05

Statement 3. This student should be watched closely.

Statement 5. Should be headed for college--encourage student to explore widely in academic areas.

Statement 7. Student is getting better grades than one would expect from looking at aptitude scores.

Statement 8. Student is not achieving as well as aptitude scores would predict.

Statement 9. Cumulative folder contains no aptitude scores for this student--try to get some.

Statement 10. Look out for over ambitious plans.

Statement 11. Student will need to strengthen quantitative skills or will probably experience academic difficulty.

Statement 12. Student should improve verbal skills. If not, student may not be able to attain desired academic goals.

Statement 14. Cumulative folder contains no grades for this student.

The hypothesis that there would be no significant differences between the second counselor and the machine was rejected for three items. Regarding the following three items the machine and the counselor did not appraise each student similarly.

Statement 4. Student is a potential drop-out.

Statement 6. Low counseling priority. No problems apparent.

Statement 13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.

In regard to direction of differences the second counselor saw fewer students as potential drop-outs, more students with a low counseling priority, and fewer cases of so great a disparity between aptitude scores and achievement to warrant a check on the test results than did the machine.

Since the pre-interview pupil appraisal was done prior to the interview there were no order or interaction effects to be tested.

2-b. Post-interview pupil appraisal. The hypothesis that there would be no significant differences between the automated counseling system and the second counselor was accepted for all five of the items as is shown in Table 12.

Question 1. Does the student indicate he is having problems with his courses?

Question 2. Does the student indicate he is going to college?

Question 3. Is he planning to take more solids than his GPA warrants?

Question 4. On the basis of his projected grades and the type of college he is planning to attend (or not to attend college or trade school at all) is the student's planning realistic, aiming too high, or aiming too low?

TABLE 12

TABLE OF TREATMENT F'S FOR POST-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	16	.251	1.238	.251	.077	4.49	2.902
2. Does the student indicate he is going to college?	1	15	0	0	0	0	4.54	0
3. Is he planning to take more solids than his GPA warrants?	1	17	.028	1.228	.028	.072	4.45	.311
4. On the basis of his projected grades and the type of college he is planning to attend, is his planning realistic, aiming too high or aiming too low?	1	16	.008	4.110	.008	.257	4.49	.031
5. What is the student's proposed college major?	1	11	.328	1.131	.328	.103	4.84	3.191

Question 5. What is the student's proposed college major: business, engineering or one of the sciences, social science, language, music and art, education, or student is not college bound?

As shown in Tables 13 and 14, there were no significant order or interaction effects for any of the items.

2-c. Educational decisions. The hypothesis that there would be no significant differences between the second counselor and the automated counseling system regarding the specific courses selected for high school was rejected for the tenth, eleventh, and twelfth grades as can be seen in Table 15.

Tables 16 and 17 show that the effects of order in which the two interviewing modes were presented and the interaction between the treatments and order were not significant for any of the items.

By taking into consideration the number of courses selected during the machine interview, the number selected during the counselor's interview, and the number of identical courses selected during both interviews, the percentage of agreement was 61 percent for the tenth grade, 52 percent for the eleventh grade, and 49 percent for the twelfth grade.

2-d. Completeness of course plans. The hypothesis that there would be no significant differences between the automated counseling system and the second counselor in terms of students making total,

TABLE 13

TABLE OF ORDER F'S FOR POST-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	B	Between Groups	B	Between Groups	B	Between Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	16	.069	6.737	.069	.421	4.49	.016
2. Does the student indicate he is going to college?	1	15	.168	1.714	.168	.114	4.54	1.470
3. Is he planning to take more solids than his GPA warrants?	1	17	.282	2.561	.282	.151	4.45	1.868
4. On the basis of his projected grades and the type of college he is planning to attend is his planning realistic, aiming too high or aiming too low?	1	16	.004	3.559	.004	.222	4.49	.018
5. What is the student's proposed college major?	1	11	.005	1.131	.005	.103	4.84	.049

TABLE 14

TABLE OF INTERACTION F'S FOR POST-INTERVIEW PUPIL APPRAISAL COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	AB	Within Groups	AB	Within Groups	AB	Within Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	16	.011	1.238	.011	.077	4.49	.725
2. Does the student indicate he is going to college?	1	15	0	0	0	0	4.54	0
3. Is he planning to take more solids than his GPA warrants?	1	17	.244	1.228	.244	.072	4.45	3.389
4. On the basis of his projected grades and the type of college he is planning to attend is his planning realistic, aiming too high or aiming too low?	1	16	.007	4.110		.007	.257	.027
5. What is the student's proposed college major?	1	11	.041	1.131	.041	.103	4.84	.399

TABLE 15

TABLE OF TREATMENT F'S FOR HIGH SCHOOL COURSE PLANNING COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
10th grade course plans	1	16	6.250	5.636	6.250	.352	4.49	17.741*
11th grade course plans	1	11	5.539	2.131	5.539	.194	4.84	28.596*
12th grade course plans	1	10	10.041	8.082	10.041	.808	4.96	12.426*

*significant beyond .05

TABLE 16

TABLE OF ORDER F'S FOR HIGH SCHOOL COURSE PLANNING COMPARING THE AUTOMATED COUNSELING SYSTEM WITH SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	B	Between Groups	B	Between Groups	B	Between Groups	Required at .05	
10th grade course plans	1	16	1.511	6.739	1.511	.421	4.49	3.589
11th grade course plans	1	11	.022	6.132	.022	.577	4.84	.395
12th grade course plans	1	10	.041	27.417	.041	2.742	4.96	.015

TABLE 17

TABLE OF INTERACTION F'S FOR HIGH SCHOOL COURSE PLANNING COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	AB	Within Groups	AB	Within Groups	AB	Within Groups	Required at .05	
10th grade course plans	1	16	.614	5.639	.614	.352	4.49	1.743
11th grade course plans	1	11	.331	2.131	.331	.194	4.84	1.719
12th grade course plans	1	10	2.377	8.082	2.377	.808	4.96	2.942

partial, or no course plans was accepted for all three grade levels as is shown in Table 18.

Tables 19 and 20 show that the effects of order and the interaction between treatments and order were not significant.

Comparison of Group I (Model Counselor and Machine) with Group II (Second Counselor and Machine)

While the automated counseling system was modeled after a single counselor's behavior, the third major aspect of the study concerned the similarity of his behavior and that of another counselor. If, in fact, a second counselor behaved similarly to the model counselor, then there is some justification in comparing counselors with the machine system.

An analysis was performed to determine those validity criteria for which the students could be considered as one group in regard to human counselors, and those for which the students must be treated as two separate groups each in regard to a specific counselor.

(Certain analyses done in regard to questions beyond the three major hypotheses, and reported in a later section, will combine the two human counselor groups.)

Hypothesis 3. The extent of agreement between the model counselor and the machine will not be significantly different from the

TABLE 18

TABLE OF TREATMENT F'S FOR COMPLETENESS OF COURSE PLANS COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
Completeness of 10th grade course plans	1	16	.028	.438	.028	.027	4.49	1.037
Completeness of 11th grade course plans	1	16	.122	7.750	.122	.484	4.49	.252
Completeness of 12th grade course plans	1	16	0	6.995	0	.437	4.49	0

TABLE 19

TABLE OF ORDER F'S FOR COMPLETENESS OF COURSE PLANS COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	B	Between Groups	B	Between Groups	B	Between Groups	Required at .05	
Completeness of 10th grade course plans	1	16	.035	.437	.035	.027	4.49	1.296
Completeness of 11th grade course plans	1	16	.356	8.200	.356	.513	4.49	.694
Completeness of 12th grade course plans	1	16	.667	10.555	.667	.660	4.49	1.011

TABLE 20

TABLE OF INTERACTION F'S FOR COMPLETENESS OF COURSE PLANS COMPARING THE AUTOMATED COUNSELING SYSTEM WITH THE SECOND COUNSELOR

Analysis Item	df		ss		ms		F	F
	AB	Within Groups	AB	Within Groups	AB	Within Groups	Required at .05	
Completeness of 10th grade course plans	1	16	.034	.438	.034	.027	4.49	1.259
Completeness of 11th grade course plans	1	16	.128	7.750	.128	.484	4.49	.264
Completeness of 12th grade course plans	1	16	.005	6.995	.005	.437	4.49	.001

extent of agreement between the automated system and the second counselor regarding:

a. pre-interview pupil appraisal,

b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of educational plans.

Since the nature of each validity measure has been reported separately in sections comparing the automated system and the model counselor, and the automated system and the second counselor, they are not repeated here unless the differences between Group I and Group II are significant.

The results of the analysis done by comparing the deviation scores (the differences between the machine and the counselor in scoring units) from the model counselor with the deviation scores of the second counselor are reported in Table 21.

The hypothesis that there would be no significant differences between Group I and Group II was accepted for all validity measures included in:

3-a. Pre-interview pupil appraisal,

3-b. Post-interview pupil appraisal,

3-c. Educational decisions, and

3-d. Completeness of educational plans.

TABLE 21

TABLE OF F'S FOR TREATMENT EFFECTS BETWEEN GROUP I AND GROUP II

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
Predicted GPA	1	38	.147	10.613	.147	.279	4.12	.527
1. Student's grades have gone down quite a bit. Ask about this in interview--there may be personal problems.	1	38	0	.950	0	.025	4.12	0
2. Student's grades have gone up. Ask about this in the next interview.	1	38	0	5.000	0	.132	4.12	0
3. This student should be watched closely.	1	38	.100	8.300	.100	.218	4.12	.459
4. Student is a potential drop-out.	1	38	.025	7.950	.025	.209	4.12	.120
5. Should be headed for college--encourage student to explore widely in academic areas.	1	38	.225	7.750	.225	.204	4.12	1.103
6. Low counseling priority. No problems apparent	1	38	.025	6.950	.025	.183	4.12	.137
7. Student is getting better grades than one would predict from look at aptitude scores.	1	38	0.25	9.950	.025	.262	4.12	.095
8. Student is not achieving as well as aptitude scores would predict.	1	38	.025	6.950	.025	.183	4.12	.137
9. Cumulative folder contains no aptitude scores for this student	1	38	0	0	0	0	4.12	0
10. Look out for over ambitious plans.	1	38	.100	9.900	.100	.261	4.12	.383
11. Student may need to strengthen quantitative skills or will probably experience academic difficulty	1	38	0	5.750	0	.151	4.12	0
12. Student should improve verbal skills. If not, student may not be able to attain desired academic goals.	1	38	0	3.600	0	.095	4.12	0
13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.	1	38	0	9.750	0	.257	4.12	0
14. Cumulative folder contains no grades for this student.	1	38	0	0	0	0	4.12	0

TABLE 21--Continued

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	38	.250	6.153	.250	.171	4.12	1.462
2. Does the student indicate he is going to college?	1	38	.100	1.800	.100	.047	4.12	2.110
3. Is he planning to take more solids than his GPA warrants?	1	38	.001	5.080	.001	.134	4.12	.007
4. On the basis of his projected grades and the type of college he is planning is his planning realistic, aiming to high or aiming too low?	1	38	0	9.7333	0	.256	4.12	0
5. What is the student's proposed college major?	1	38	.056	6.531	.056	.172	4.12	.326
Course plans 10th grade	1	38	.126	28.278	.126	.757	4.12	.166
Course plans 11th grade	1	26	.661	18.089	.661	.696	4.22	.950
Course plans 12th grade	1	24	.330	27.415	.33	1.142	4.26	.289
Completeness of educational plans 10th grade	1	36	.085	3.494	.085	.097	4.12	.876
Completeness of educational plans 11th grade	1	38	.014	7.994	.014	.210	4.12	.067
Completeness of educational plans 12th grade	1	38	.225	20.875	.225	.549	4.12	.410

By taking into consideration the total number of courses selected for the machine interview, the number of the counselors' interview, and the total number of identical courses selected in both interviews, the machine showed agreement of 62 percent with the model counselor. and 55 percent with the second counselor. Although the machine matched more closely the model counselor in terms of specific courses selected, these differences were not great enough to be significant.

In addition to testing the hypothesis of no significant differences between Group I and Group II, the effects of the order of interview mode presentation on the total sample was investigated. This was done by comparing the deviation scores between the machine and the counselors for those students who had the machine interview first with those who had the counselor interview first as shown in Table 22. For this combined group there were no significant differences in regard to order for any of the validity measures except for tenth grade course plans. For tenth grade course plans there was significantly greater variance between the counselors and the machine when the machine was first than when the counselor was first.

Thus, for the purpose of the subsequent analyses reported below, the findings just discussed justify considering the total sample as one group receiving two treatments: (1) counselor

TABLE 22

TABLE OF F'S FOR ORDER EFFECTS BETWEEN MACHINE 1ST AND COUNSELOR 1ST

Analysis Item	df		ss		ms		F	F
	B	Between Groups	B	Between Groups	B	Between Groups	Required at .05	
1. Does the student indicate he is having problems with his courses?	1	38	.017	6.797	.017	.179	4.12	.095
2. Does the student indicate he is going to college?	1	38	.1	1.8	.1	.047	4.12	2.110
3. Is he planning to take more solids than his GPA warrents?	1	38	.003	5.480	.003	.144	4.12	.021
4. On the basis of his projected grades and the type of college he is planning to attend, is his planning realistic, aiming too high or aiming too low?	1	38	.088	8.639	.088	.227	4.12	.388
5. What is the student's proposed college major?	1	38	.035	6.550	.035	.172	4.12	.203
Course plans 10th grade	1	38	3.750	14.779	3.750	.389	4.12	9.640*
Course plans 11th grade	1	24	.336	28.409	.336	1.184	4.26	.284
Course plans 12th grade	1	26	.019	17.712	.019	.681	4.22	.028
Completeness of educational plans 10th grade	1	36	.079	3.500	.079	.097	4.12	.814
Completeness of educational plans 11th grade	1	38	.039	17.004	.039	.447	4.12	.087
Completeness of educational plans 12th grade	1	38	.057	15.672	.057	.412	4.12	.138

* significant beyond .05

interview and (2) machine interview. In addition, order is disregarded except for tenth grade course plans in which order 1 (machine first) is treated apart from order 2 (counselor first).

Further Analyses

In addition to testing the three major hypotheses, several other analyses were done. The first three analyses listed below continue to make comparisons between the model counselor and the machine and between the second counselor and the machine. The fourth analysis treats the entire sample as one group making no distinction between the model counselor and the second counselor subgroups.

1. A comparison between the counselors and the machine using the number of students making total course plans as the criterion measure. This differs from hypotheses 1-d, 2-d, and 3-d in that only the students who make total course plans are compared. This analysis determines the percentage of students making total course plans whereas the testing of the hypotheses 1-d, 2-d, and 3-d determined whether or not there were significant differences regarding students making total, partial, or no course plans.

2. A comparison between the experimentally chosen tenth grade course plans (those chosen during the machine and the counselors' interview) and the tenth grade courses for which the students officially registered two weeks following the collection of data.

3. A determination of the nature of course changes by comparing the courses selected during the counselor's interview with the courses selected during the machine interview for all three high school grades, the machine chosen tenth grade courses with final tenth grade courses, and the counselor chosen tenth grade courses with final tenth grade courses.

4. An analysis of the items which indicated significant differences between counselors and the automated counseling system regarding sex, national and local School and College Ability Test norms, and family socio-economic level.

In cases where the significance of differences could be tested the null hypotheses was used, i.e., the differences were attributed to chance unless they exceeded the .05 level. Some data are reported in simple percentage form.

Comparison Between Machine and Counselor Using Students Making Total Course Plans as the Validity Measure. An objective for determining the effectiveness of an educational planning interview might be whether or not the student is able to make complete course plans. Disregarding the agreement between the counselor and the machine in terms of actual courses selected or the comparison of students making total, partial, or no course plans between the counselor and the machine, this analysis compares the two counseling modes in terms of the percentage of students who made total course plans.

The percentages as shown in Tables 23, 24, and 25, have been computed for the machine and the model counselor for the tenth, eleventh, and twelfth grades, the machine and the second counselor for the tenth, eleventh, and twelfth grades, and a total comparison between the computer and the counselors combining all three high school years.

Comparison between the Model Counselor and the Computer in Terms of Total Course Plans. The percentage of students who made total course plans was computed for the model counselor and the machine in terms of tenth, eleventh and twelfth grades. An average percentage for all three years was computed for the counselor and for the machine.

Using a test to determine the significance of differences between uncorrelated percentages indicated that while more students who saw the counselor than those who saw the machine made total course plans these differences were not significant. The counselor's interview did not produce significantly more total course plans than the machine interview.

Comparison Between the Second Counselor and the Computer in Terms of Total Course Plans. The percentage of students who made

TABLE 23

COMPUTER VERSUS MODEL COUNSELOR IN TERMS OF TOTAL COURSE PLANS

Course Plans	Interview Mode	Percentage making Total Plans	
10th grade	Machine	95%	
10th grade	Counselor	90%	
11th grade	Machine	70%	
11th grade	Counselor	75%	
12th grade	Machine	55%	
12th grade	Counselor	70%	
Total	Machine	73%	CR = .38
Total	Counselor	78%	$P > .05$

TABLE 24

COMPUTER VERSUS SECOND COUNSELOR IN TERMS OF TOTAL COURSE PLANS

Course Plans	Interview Mode	Percentage making Total Plans	
10th grade	Machine	94%	
10th grade	Counselor	100%	
11th grade	Machine	67%	
11th grade	Counselor	33%	
12th grade	Machine	56%	
12th grade	Counselor	22%	
Total	Machine	72%	CR = 1.67
Total	Counselor	52%	$P > .05$

TABLE 25

COMPUTER VERSUS COUNSELORS IN TERMS OF TOTAL COURSE PLANS

Course Plans	Interview Mode	Percentage making Total Plans	
Total	Machine	73%	CR = .39
Total	Counselor	69%	$P > .05$

total course plans was computed for the second counselor and the machine in terms of tenth, eleventh and twelfth grades. An average percentage for all three years was computed for the counselor and the machine.

A test of the significance of differences between uncorrelated percentages indicated that while on the average more students who saw the machine than those who saw the counselor made total course plans these differences were not significant. The machine interview did not produce significantly more course plans than the counselor's interview.

Total Comparison Between the Counselors and the Computer in Terms of Total Course Plans. An average percentage for all three years of high school course plans and for both counselors was compared with the computer's average total course plan percentage for the three high school years.

While a slightly larger percentage of students made total course plans during the automated interview the differences between the percentage of students making total course plans during the automated interview and the percentage of students making total course plans during the counselors' interview were not significant.

Comparison Between Experimentally Chosen Tenth Grade Course Plans and Actual Tenth Grade Course Plans. Shortly after the data for this study were collected the students registered for their actual tenth grade courses. Although the prime objective of this study was to determine the differences between the computer chosen and the counselor chosen course programs another facet which merited investigation was the relationship between the experimentally chosen course programs, the model and second counselor and the machine interviews, and the courses actually selected by the student for the tenth grade.

Comparisons were made between the machine interview-order 1, having the machine interview first, and actual tenth grade plans; machine interview-order 2, having the counselor's interview first, and actual tenth grade plans; counselor's interview-order 1 and tenth grade plans; and counselor's interview-order 2 with actual tenth grade plans. Table 26 reports the results of this analysis.

Comparison Between Machine Chosen Tenth Grade Course Plans and Actual Tenth Grade Course Plans.

1. Machine Interview -- Order 1

The course plans for the tenth grade made during the automated system interview for those students seeing the machine first, subgroups IA and IIA, were compared with the actual tenth grade course plans for these same students.

The hypothesis that there would only be chance differences between the machine interview course plans and the actual course

TABLE 26

COMPARISON BETWEEN EXPERIMENTALLY CHOSEN 10TH GRADE COURSE PLANS AND ACTUAL 10TH GRADE COURSE PLANS

Analysis Items	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
Comparison between final 10th grade course plans and machine 10th grade course plans -- Machine interview first	1	36	3.790	12.526	3.790	.348	4.12	10.891*
Comparison between final 10th grade course plans and machine 10th grade course plans -- Counselor interview first	1	38	1.600	10.300	1.600	.271	4.12	5.904*
Comparison between machine first and counselor first groups -- Machine 10th grade course plans versus Final 10th grade plans	1	37	.522	17.744	.522	.480	4.12	1.088
Comparison between final 10th grade course plans and 10th grade course plans and counselor 10th grade course plans--Machine interview first	1	36	.238	4.736	.238	.132	4.12	1.803
Comparison between final 10th grade course plans and counselor 10th grade course plans--Counselor interview first	1	38	.400	5.500	.400	.145	4.12	2.759
Comparison between machine first and counselor first groups -- Machine 10th grade course plans versus final 10th grade plans	1	37	.018	7.776	.018	.209	4.12	.086

* significant beyond .05

plans was rejected. There were significant differences between the machine course plans and the actual course plans.

2. Machine Interview -- Order 2

The course plans for the tenth grade made during the automated system interview for those students seeing the counselor first, subgroups IB and IIB, were compared with the actual tenth grade course plans for these same students.

The hypothesis that there would only be chance differences between the machine interview course plans and the actual course plans was rejected. There were significant differences between the machine course plans and the actual course plans.

3. Comparison of the Machine 1st and Counselor 1st Groups in Terms of Machine Course Plans Versus Actual Course Plans.

In an attempt to determine if there were any differences between the machine 1st (order 1) and counselor 1st (order 2) in making the comparison between machine tenth grade course plans and actual course plans the deviation scores between the machine-order 1 group was compared with the deviation scores of machine-order 2. A deviation score was computed for each student by scoring the differences between the machine chosen course plan and the actual course plan.

The hypothesis that there would be only chance differences between machine-order 1 and machine-order 2 was accepted. The differences were not significant.

Comparison Between Counselor Chosen Tenth Grade Course Plans and Actual Tenth Grade Course Plans.

1. Counselors' Interview -- Order 1

The course plans for the tenth grade made during the counselors' interview for those students seeing the machine first, subgroups IA and IIA, were compared with the actual tenth grade course plans for those same students.

The hypothesis that there would only be chance differences between the counselor's interview course plans and the actual course plans was accepted. There were no significant differences between counselors' interview-order 1 and the actual tenth grade course plans. In making their actual course plans the students follow closely the plans made during the counselors' interview.

2. Counselors' Interview -- Order 2

The course plans for the tenth grade made during the counselors' interview for those students seeing the counselor first, subgroups IB and IIB, were compared with the actual tenth grade course plans for these students.

The hypothesis that there would be only chance differences between the counselors' interview course plans and the actual course plans was accepted. There were no significant differences between counselors' interview-order 2 and the actual tenth grade course plans. In making their actual course plans the students follow closely the plans made during the counselors' interview.

3. Comparison of Machine 1st and Counselor 1st Groups in Terms of Counselors' Course Plans Versus Actual Course Plans.

In an attempt to determine if there were any differences between machine 1st (order 1) and counselor 1st (order 2) in making comparison between counselors' tenth grade course plans and actual course plans the deviation scores between the counselors'-order 1 group was compared with the deviation scores of counselors'-order 2. A deviation score was computed for each student by scoring the differences between counselor chosen course plan and the actual course plan.

The hypothesis that there would be only chance differences between counselors'-order 1 and counselors'-order 2 was accepted. In terms of deviation from final course plans there were no significant differences between the counseling interview being first or last.

Nature of Course Changes. The nature of course changes involved two aspects: from what kind of course to what kind of course did the students move, and was the movement out of an academic area or did it remain in the same area. The nature of change has been investigated for counselor-machine differences, machine-final course plan, differences, and counselor-final course plan differences.

Nature of Course Changes Between the Machine Interview and Counselors' Interview. Table 27 shows that three types of movement were responsible for 68 percent of the course changes. These types were from special unit to special unit (32%), elective to an elective (22%), and from elective to no course (14%). Each of the remaining twelve possible types of changes were responsible for 0 to 5 percent of the change.

Of these changes, in the tenth grade 68 percent involved changing from one course to another in the same field, for example, a change from art history to ceramics, in the eleventh grade 50 percent of the changes were within the same field and in the twelfth grade 45 percent. A total of 93 course changes were made.

Nature of Course Changes Between Machine Interview and Actual Tenth Grade Course Plans. Four types of movement were responsible for 71 percent of the course changes as can be seen in Table 28. These types were from special unit to elective (17%),

TABLE 27

NATURE OF COUNSELOR AND MACHINE COURSE CHANGES

Direction of Change		Number of Changes 10th grade	11th grade	12th grade	Total	% of Change
Special Unit	to Special Unit	6	13	10	29	32%
Special Unit	to solids	2	0	1	3	3
Special Unit	to elective	2	2	1	5	5
Special Unit	to no course	0	1	3	4	4
Solid	to Special Unit	1	1	0	2	2
Solid	to solid	1	0	1	2	2
Solid	to elective	0	0	0	0	0
Solid	to no course	0	1	1	2	2
Elective	to Special Unit	2	3	0	5	5
Elective	to solid	0	0	0	0	0
Elective	to elective	7	7	6	20	22
Elective	to no course	5	3	5	13	14
No course	to Special Unit	0	0	3	3	3
No course	to solid	1	1	0	2	2
No course	to elective	0	2	1	3	3
Total		27	34	32	93	99%

TABLE 28

NATURE OF COURSE CHANGES BETWEEN MACHINE AND FINAL 10TH GRADE PLANS

Direction of Change		% of Change	Number of Changes
Special Unit	to Special Unit	4	1
Special Unit	to solids	4	1
Special Unit	to elective	17	4
Special Unit	to no course	4	1
Solid	to Special Unit	4	1
Solid	to solid	4	1
Solid	to no course	4	1
Elective	to Special Unit	4	1
Elective	to elective	21	5
Elective	to no course	8	2
No course	to elective	25	6
Total		99	24

elective to elective (21%), elective to no course (8%), and no course to elective (25%). Each of the remaining twelve possible types of changes were responsible for 0 to 4 percent of the change.

Of the changes between the machine course plans and final course plans 43 percent of the changes were within the same area. There was a total of 24 course changes.

Nature of Course Changes Between Counselors' Interview and Actual Tenth Grade Course Plans. Only three types of movement out of fifteen possible types were present as indicated by Table 29. Special unit to elective (57%), elective to elective (14%), and no course to elective (29%), were the types involved.

Only 20 percent of the changes in courses were in the same field. And there were only seven changes between the counselors' interview and the final course plans.

Analysis Based on Sex. The analysis using sex as a variable tested the differences between male and female in terms of deviation scores. The deviation scores were computed by scoring the differences between the counselors' interview and the automated counseling system interview. The group was composed of 23 males and 17 females.

Previous analyses indicated no significant differences between order 1 (machine 1st) and order 2 (counselor 1st) except for tenth grade course plans. Therefore the order 1 and order 2 machine

TABLE 29

NATURE OF COURSE CHANGES BETWEEN COUNSELOR AND FINAL 10TH GRADE PLANS

Direction of Change	% of Change	Number of Changes
Special Unit to elective	57	4
Elective to elective	14	1
No course to elective	29	2
Total	100	7

groups were combined into one group and the order 1 and order 2 counselor groups were combined into one group except for tenth grade course plans which was analyzed by order 1 and by order 2. For this analysis both counselors were combined into one group and all machine interviews into one group.

The items which were analyzed and reported in Table 30, those which showed significant differences in previous analyses testing the three major hypotheses were; GPA, pre-interview appraisal statements 4, 5, 6, 7, 13, post-interview appraisal question 6, course schedule tenth grade-order 1, course schedule tenth grade-order 2, eleventh grade course schedule, twelfth grade course schedule, and completeness of course plans for the twelfth grade.

The resulting analysis showed no significant differences between male and female on any of the items. Sex did not cause any of the differences found between the machine and counselor outcomes.

Analysis Based on School and College Ability Test Scores. Two separate analyses were done. One using national SCAT norms and one using local SCAT norms. In both cases the students were divided into two groups: the high SCAT group (those students above the norm mean) and the low SCAT group (those students below the norm mean). The mean for the local norm was 65 percentile and the mean for the national norms was 50 percentile. The scores ranged from 3 to 97

TABLE 30

TABLE OF F'S FOR DIFFERENCES BETWEEN SEXES

	Analysis Items	df		ss		ms		F	F
		A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
	Predicted GPA	1	33	1.153	77.033	1.153	.668	4.17	1.775
4.	Student is a potential drop out.	1	38	.075	7.497	.075	.197	4.12	.381
5.	Should be headed for college— encourage student to explore widely in academic areas.	1	38	.001	8.399	.001	.221	4.12	.005
6.	Low counseling priority. No problems apparent.	1	38	.164	6.833	.164	.180	4.12	.911
7.	Student is getting better grades than one would expect from look at aptitude scores.	1	38	.088	9.883	.088	.260	4.12	.338
13.	The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.	1	38	.148	9.452	.148	.249	4.12	.594
5.	What is student's proposed college major?	1	31	.410	4.135	.410	.133	4.17	3.083
	Course schedule 10th grade Machine 1st	1	16	.003	21.972	.003	1.373	4.49	.002
	Course schedule 10th grade Counselor 1st	1	18	.208	8.792	.208	.488	4.41	.426
	Course schedule 11th grade	1	23	.336	13.094	.356	.525	4.28	.678
	Course schedule 12th grade	1	20	.055	24.900	.055	1.745	4.35	.044
	Completeness of course plans 12th grade	1	36	.097	15.614	.097	.434	4.12	.224

percentile. Using the national norms there were 28 students in the high group and 12 students in the low group. Using the local norms there were 24 students in the high group and 16 students in the low group.

Previous analyses indicated no significant differences between order 1 (machine 1st) and order 2 (counselor 1st) except for tenth grade course plans. Therefore the order 1 and order 2 machine groups were combined into one group and the order 1 and order 2 counselor groups were combined into one group except for tenth grade course plans which was analyzed by order 1 and order 2. For the entire analysis both counselors were combined into one group and all machine interviews into one group.

The items which were analyzed and reported in Tables 31 and 32, were: GPA, pre-interview appraisal statements 4, 5, 6, 7, 13, post-interview appraisal question 6, course schedule tenth grade-order 1, course schedule tenth grade-order 2, eleventh grade course schedule, twelfth grade course schedule, and completeness of course plans for the twelfth grade.

Results Based on National SCAT Norms. The items which showed significant differences between high and low groups were GPA, appraisal statement 4 -- Student is a potential drop-out, appraisal statement 7 -- Student is getting better grades than one would expect

TABLE 31

TABLE OF F'S FOR DIFFERENCES BETWEEN HIGH AND LOW SCAT GROUPS--NATIONAL NORMS

Analysis Item	df		ss		ms		F	F
	A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
Predicted GPA	1	33	1.780	8.163	1.780	.247	4.17	7.206*
4. Student is a potential drop out.	1	38	1.629	4.717	1.629	.124	4.12	13.137*
5. Should be headed for college— encourage student to explore widely in academic areas.	1	38	.304	8.096	.304	.213	4.12	1.427
6. Low counseling priority. No problems apparent.	1	38	.344	6.631	.344	.175	4.12	1.966
7. Student is getting better grades than one would expect from look at aptitude scores.	1	38	2.201	9.774	2.201	.257	4.12	7.864*
13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.	1	38	.576	8.024	.576	.211	4.12	2.730
5. What is student's proposed college major?	1	31	.011	6.535	.011	.211	4.17	.052
Course schedule 10th grade Machine 1st	1	18	.536	14.678	.536	.815	4.41	.658
Course schedule 10th grade Counselor 1st	1	16	.731	11.769	.731	.736	4.49	.993
Course schedule 11th grade	1	23	.256	12.928	.256	.562	4.28	.456
Course schedule 12th grade	1	20	.618	26.582	.618	1.329	4.35	.465
Completeness of course plans 12th grade	1	36	2.075	12.561	2.075	.349	4.12	5.946*

*significant beyond .05

TABLE 32

TABLE OF F'S FOR DIFFERENCES BETWEEN HIGH AND LOW SCAT GROUPS--LOCAL NORMS

Analysis Item	df		ss		ms		F Required at .05	F
	A	Within Groups	A	Within Groups	A	Within Groups		
Predicted GPA	1	33	.867	10.876	.867	.340	4.17	2.550
4. Student is a potential drop out.	1	38	4.538	4.437	4.538	.117	4.12	38.786*
5. Should be headed for college— encourage student to explore widely in academic areas.	1	38	.338	8.062	.338	.212	4.12	1.594
6. Low counseling priority. No problems apparent.	1	38	.267	6.708	.267	.177	4.12	1.508
7. Student is getting better grades than one would expect from look at aptitude scores.	1	38	4.267	5.658	4.267	.147	4.12	28.638*
13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.	1	38	1.350	8.250	1.350	.217	4.12	6.221*
5. What is student's proposed college major?	1	31	.010	6.536	.010	.211	4.17	.047
Course schedule 10th grade Machine 1st	1	18	.124	15.526	.124	.863	4.41	.144
Course schedule 10th grade Counselor 1st	1	16	1.098	10.402	1.098	.650	4.49	1.689
Course schedule 11th grade	1	23	1.090	12.350	1.090	.537	4.28	2.029
Course schedule 12th grade	1	20	.028	27.790	.028	1.340	4.35	.021
Completeness of course plans 12th grade	1	36	1.449	14.262	1.449	.396	4.12	3.660

* significant beyond .05

from looking at aptitude scores, and completeness of twelfth grade course plans. In all cases where significant differences occurred there was significantly less variance with the high group than with the low group.

Results Based on Local SCAT Norms. Items which showed significant differences between high and low groups were appraisal statement 4 -- Student is a potential drop-out and appraisal statement 7 -- Student is getting better grades than one would expect from looking at aptitude scores. In each of the above cases there was significantly less variance with the high SCAT group than with the low group.

Analysis Based on Socio-Economic Level. Students were divided into three socio-economic groups based on their father's or mother's (if father was deceased) occupation: professional and managerial, semi-professional, and labor including skilled, semi-skilled, and unskilled labor. When the vocational classification, a modification of Roe's occupational classification system, was in question the educational level was used as a determinent. College or college plus graduate work was used for the profession-managerial group, high school or high school and some college was used for the semi-professional catagory, and less than high school was used for the labor classification. There were 20 students in the professional-managerial group, 9 students in the semi-professional group, and 11 in the labor group.

Previous analyses indicated no significant differences between order 1 (machine 1st) and order 2 (counselor 1st) except for tenth grade course plans. Therefore the order 1 and order 2 machine groups were combined into one group and the order 1 and order 2 counselor groups were combined into one group except for tenth grade course plans which was analyzed by order 1 and order 2. For the entire analysis both counselors were combined into one group and all machine interviews into one group.

The items which were analyzed and reported in Table 33 were GPA, pre-interview appraisal statements 4, 5, 6, 7, 13, post-interview appraisal question 6, course schedule tenth grade order 1, course schedule tenth grade order 2, eleventh grade course schedule, twelfth grade course schedule, and completeness of course plans for the twelfth grade.

The resulting analysis showed no significant differences between the three socio-economic groups on any of the items. Socio-economic level was not responsible for any of the differences found between machine and counselor outcomes.

Analysis of Specific Limitations of the Computer Based Counseling System

Since it was possible that some of the qualities found normally in a human counselor's interview might be lacking in the automated

TABLE 33

TABLE OF F'S FOR DIFFERENCES BETWEEN SOCIO-ECONOMIC LEVELS

	Analysis Item	df		ss		ms		F	F
		A	Within Groups	A	Within Groups	A	Within Groups	Required at .05	
	Predicted GPA	2	32	.487	12.056	.244	.377	3.32	.647
4.	Student is a potential drop out.	2	37	.492	7.483	.246	.202	3.26	1.218
5.	Should be headed for college— encourage student to explore widely in academic areas.	2	37	.367	5.408	.184	.146	3.26	1.260
6.	Low counseling priority. No problems apparent.	2	37	.139	6.836	.070	.185	3.26	.378
7.	Student is getting better grades than one would expect from look at aptitude scores.	2	37	.993	8.982	.497	.243	3.26	2.045
13.	The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test results.	2	37	1.366	8.234	.683	.223	3.26	3.063
5.	What is student's proposed college major?	2	30	1.168	5.377	.584	.179	3.32	3.263
	Course schedule 10th grade Machine 1st	2	17	.417	15.333	.209	.902	3.59	.232
	Course schedule 10th grade Counselor 1st	2	15	1.261	7.850	.631	.523	3.68	1.207
	Course schedule 11th grade	2	22	1.082	12.358	.541	.561	3.44	.964
	Course schedule 12th grade	2	20	4.080	27.833	2.040	1.392	3.49	1.466
	Completeness of course plan 12th grade	2	35	.284	12.584	.142	.360	3.26	.394

counseling interview the students were asked questions concerning machine limitations, attention span, reinforcers, sensitivity to need and orientation, student cooperation, and reservations about course plans during a short structured interview following completion of both the machine and the counselor's interview. The results of the structured interview follows below.

Machine Limitations. Of the students who could not make a total course plan for the tenth grade none felt that this was caused by the machine not presenting the material clearly enough. None of the students who failed to make a tenth grade plan attributed this to the machine lacking necessary information.

Attention Span. Only one student out of forty terminated the machine interview before attempting a course plan. Ninety-four percent of the students felt the machine interview did not make them feel bored or restless.

Lack of Reinforcers. Twenty-six percent of the students felt the fact that they didn't always know whether their responses to the machine were appropriate or not increased the difficulty of making course selections.

Of those students not completing a course program twenty percent felt not having the counselor in the room made it more difficult to make adequate course selections.

Lack of Sensitivity to Needs and Orientations. Fifty-three percent of the students felt the machine was not able to take into consideration all the information necessary to meet their personal needs in terms of what should be involved with high school course planning.

Lack of Student Cooperation. None of the students tried to jam the machine or type in ridiculous responses.

Reservations About Course Plans. Fifty-six percent of the students making tenth grade course plans on the computer had reservations about these course plans while only twenty percent of the students had reservations about the tenth grade course plans made with the counselors.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

Statement of the Problem

The problem with which this study has been concerned is the validity of an existing computer-based counseling system, which was developed to simulate the decision-making behavior and logic of a counselor counseling with ninth grade students in regard to their educational planning for high school.

In addition to determining the validity of a computer-based counseling system by comparisons between the automated system and the model counselor, comparisons were made between a second counselor and the automated counseling system. The study was concerned with the following two-fold problem.

1. How well does the automated counseling system agree with the counselors in terms of pupil appraisal?

2. How well does the automated counseling system agree with the counselors in educational planning for high school?

Research Methods and Procedures

Hypotheses. 1. The automated counseling system will not be significantly different from the model counselor regarding:

a. pre-interview pupil appraisal,

b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of educational plans.

2. The automated counseling system will not be significantly different from the second counselor regarding:

a. pre-interview pupil appraisal,

b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of educational plans.

3. The extent of agreement between the automated system and the model counselor will not be significantly different from the extent of agreement between the automated system and the second counselor regarding:

a. pre-interview pupil appraisal,

b. post-interview pupil appraisal,

c. educational decisions, and

d. completeness of course plans.

Sample. Forty ninth grade students (23 boys and 17 girls) were drawn at random from Wilbur Junior High School in Palo Alto, California. The students ranged in academic ability from 3 percentile to 98 percentile, with a sample mean of 65 percentile, based on School and College Ability Test scores, national norms.

Treatment. The sample was randomly divided into two groups of 20 students each. One group was interviewed by the model counselor and the automated counseling system, and the second group was interviewed by the second counselor and the automated counseling system. As a precaution to offset the effects of order of interviewing mode, each of the two groups was subdivided into two subgroups. One subgroup was interviewed first by the machine and then by a counselor, and the second subgroup was interviewed first by a counselor and then by the machine.

Nature of the Data Collected. Statements and answers to questions relating to pre-interview and post-interview appraisal were obtained from the model counselor, the second counselor, and the machine. In addition, results of the educational planning interview, that is, the specific courses selected for high school and the degree of completeness of course planning, and data relating to limitations of the computer-based counseling system were collected for each interview.

Data regarding student's sex, SCAT scores, family socio-economic level and final tenth grade course plans (the courses for which the student officially registered two weeks following the collection of data) were also collected for subsequent analyses of items which proved to have significant differences between the counselor and the machine.

Data Collection Procedures. Predictions and evaluations about the students made prior to the counseling interview were collected from the counselors by the use of questionnaires for the purpose of pre-interview pupil appraisal. Machine print-outs containing similar data for each student were collected. Following the interview, post-interview pupil appraisal data (evaluations made on the basis of interview outcomes) were collected in the same manner as pre-interview pupil appraisal data. For the information relating to course planning, the student's course schedule form completed during the counselors' interview, and the machine output (course selections typed into the machine by students), were collected. Data involving limitations of a computer-based counseling system were gathered from the machine output and from a structured interview following the completion of both interviews. Information such as sex, SCAT scores, family socio-economic level, and final tenth grade course plans were taken from school files.

Data Treatment Methods. A determination of the extent of agreement between treatments (machine versus counselor) was the prime objective. However, it was necessary to determine what effects order of interview mode presentation and interaction between treatments and order, had upon treatments. The extent of agreement between the model counselor and the automated system, and the extent of agreement between the second counselor and the automated system, was determined by using a Type I design, which yields F ratios by which the significance of treatments, order, and interaction were determined. In order to improve the preciseness of the evaluations involving course plans a percentage of agreement between the two counseling modes were calculated.

The similarity between two counseling modes or between groups was assumed if the F ratio was smaller than that required for the .05 level of significance.

The effects of order on the total sample and the differences between Group I (those students seen by the model counselor and the machine) and Group II (those seen by the second counselor and the machine) were determined by employing a simple randomized design utilizing deviation scores (the scored differences between the counselor and the machine) for the basis of comparison.

The automated counseling system and the counselors were compared on the basis of the percentage of students making total course plans.

The extent of agreement between the experimentally chosen tenth grade course plans and the final tenth grade course plans were determined by using a simple randomized design.

The nature of course changes was investigated by determining the direction of movement and the percentages of changes involving courses in the same adacemic field.

Subsequent analyses were done for the items which showed significant differences between the counselors and the automated counseling system. The factors investigated in these analyses were sex, scholastic ability as measured by SCAT scores, and socio-economic level all involving the use of a simple randomized design.

An indication of some limitations of a computer-based counseling system was determined by student responses during the structured interview. These responses were reported on a percentage basis.

Analyses of Data

Three major hypotheses were tested: (1) the automated counseling system will not be significantly different from the model counselor, (2) the automated counseling system will not be significantly different from the second counselor, and (3) the extent of agreement between the automated system and the model counselor will not be significantly different from the extent of agreement between the automated system and the second counselor, each in regard to (a) pre-interview pupil appraisal, (b) post-interview pupil appraisal, (c) educational decisions, and (d) completeness of educational plans.

The Model Counselor and the Automated Counseling System. Hypothesis 1 was rejected for the following pre-interview pupil appraisal items: predicted GPA; Statement 4. Student is a potential drop-out; Statement 5. Should be headed for college-encourage student to explore widely in academic areas; Statement 7. Student is getting better grades than one would predict from looking at aptitude scores; Statement 13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test-check test results. The hypothesis was rejected for post-interview pupil appraisal Question 5, which stated the student's proposed college major. Hypothesis 1 was rejected for grades ten and twelve regarding educational decisions, and for grade twelve concerning completeness of educational plans.

There were significiant order effects on one item, post-interview pupil appraisal Question 1. Does the student indicate he is having problems with his courses, and interaction effects regarding tenth and twelfth grade course plans.

The Second Counselor and the Automated Counseling System. Hypothesis 2 was rejected for the following pre-interview pupil appraisal item: Statement 4. Student is a potential drop-out; Statement 6. Low counseling priority - no problems apparent; and Statement 13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test - check test results. Hypothesis 2 was also rejected for grades ten, eleven, and twelve regarding educational decisions.

None of the items showed either significant order or interaction effects.

Comparison between Group I (model counselor versus the automated counseling system) and Group II (second counselor versus the automated counseling system). In regard to treatment (counselor versus machine) Hypothesis 3 was accepted for all items. There were no significant differences between the two counselors. In determining the total effects of order, combining the results of both counselors, there was a significant difference for only the tenth grade course plans.

Further Analyses

Comparison Between Counselors and the Automated Counseling System in Terms of Total Course Plans. There were no significant differences between the counselors and the machine in terms of the percentage of students making total course plans.

Comparison Between Experimentally Chosen Tenth Grade Course Plans and Final Tenth Grade Course Plans. There were significant differences between computer chosen tenth grade courses and final tenth grade course plans (those courses for which the students officially registered two weeks following data collection), but there were no significant differences between counselor selected tenth grade courses and final tenth grade course plans.

Nature of Course Changes. Most of the movement involved three types of changes, special unit to special unit, elective to elective, and elective to no course. Over 50 percent of the changes involved moving from one course to another within the same academic field.

Analyses Based on Sex, SCAT Scores, and Family Socio-economic Level. Of the items which showed significant differences between the counselors and the computer none indicated the differences were due to sex. When analysis was done using SCAT scores -- national norms as the basis for comparison, there were significant differences between high and low groups on predicted GPA, pre-interview pupil appraisal statement 4, pre-interview pupil appraisal statement 7, and completeness of twelfth grade course plans. When using SCAT scores, local norms, significant differences were found for appraisal statements 4 and 7. Analyzing the items in terms of family socio-economic level showed no significant differences between any of the levels.

Limitations of a Computer-based Counseling System. The majority of the students felt the presentation of the material, the nature of the material, and the amount of machine reinforcement or feedback was sufficient to make course plans. However, 53 percent felt the machine could not take into consideration all the information necessary to meet their personal needs in terms of adequate course planning. Fifty-six percent of the students had reservations about the tenth grade course plans chosen by the aid of the machine while only 20 percent had such reservations about plans made with the aid of the counselor.

Discussion and Conclusions

Discussion

The major implication of this study can be identified within the following three general catagories:

(1) implications for further research and development of the automated counseling system itself,

(2) implications for experimental implementation of the automated counseling system in a real school environment and,

(3) implications for other related research and development concerned with automation in counseling and guidance.

As will become obvious in the further discussion, these are not mutually exclusive catagories. In spite of the overlap, they do provide a useful vehicle for discussion the major implications of this study.

Implication for Further Research and Development of the Automated Counseling System. The question arose during the pilot phase of this study as to whether a composite counseling model should be built, which would incorporate the best features of several counselors, or whether the behavior of one counselor should be simulated. The problem of establishing validity criteria for the simulation of a model counselor was a less difficult one than for a composite system. However, it could be possible to build a composite counseling model if the differences between the model counselor and a second counselor, regarding the criteria used in this study, were not significant even though they were different regarding counseling style. The results of this study support the notion that a working composite counseling model can be built. In analyzing the interview tape recordings of many counselors during the pilot study, it was apparent that a great deal of variance existed regarding counseling style. The model counselor's style was very straight forward and the counseling process was not difficult to flow chart. The second counselor's style while involving identifiable rules had a great deal of variance concerning these. This would have necessitated the analysis of many more interviews before adequate criteria for the use of these rules could be established. Yet in terms of counseling outcomes, based on the criteria used in this study, there were no significant differences between the two counselors.

In terms of further research, it must be determined how much non-actuarial data should be included in the machine program regarding pupil appraisal. It may be that the use of a good deal of non-actuarial data would not improve the predictive validity of the machine pupil appraisal. The second counselor using, in addition to actuarial data, extensive personal knowledge of the students had closer agreement with the machine than did the model counselor using actuarial, cumulative record, and interview data. If the inclusion of a large amount of personal information about the students does improve prediction, then the rules for the use of this data could be identified and incorporated into the program. Even if the inclusion of personal student information does not improve the predictive validity of factors related to pupil appraisal, this information could be used in further application of an automated system in other areas of counseling such as, educational-vocational planning and personal problems.

Though the differences between the machine and the model counselor were generally significant regarding the selection of specific courses, 66 percent of agreement for the tenth grade is a fairly acceptable rate for the machine considering this was the first run. With the possibility of improving the percentage of agreement (discussed in the section dealing with the implementation of the automated counseling system into a real school environment) it appears that it would be possible to simulate a counselor aiding students in other decision-making tasks. The next step would be to define the tasks to be simulated and attempt to identify the rules used in this process.

The failure of the machine system to achieve a greater degree of simulation in regard to course selection may be attributed to several causes. It is possible that the computer program did not include critical rules used by the counselor. On the other hand, the program may be adequate, but the interaction with the machine itself might constitute a situation including certain aspects (unrelated to the program) which have an adverse affect on the pupils course selection behavior, in that the program inadvertantly included rules or at least features which were unlike the behavior of the model counselor. It could, of course, be a combination of all three. It may also be that there are certain counselor qualities which will defy programming, such as sensitivity to non-verbal cues.

Part of the feasibility of using an automated counseling system in schools was supported by the students' enthusiastic acceptance of the system. A question arises regarding the use of such a system after implementation into a school system. If the automated system is seen as just a novelty, the use of the machine will diminish rapidly. However, if the same pattern is followed concerning the use of the system as with other data systems, the problem will become that of over use and pressure to expand the system to do more and more things rather than disuse.

This study has been concerned with the simulation of a single counselor. No attempt has been made to determine which of the two counseling modes is better in terms of course planning or pupil appraisal. A machine model designed to better a counselor could be investigated. Instead of simulating a single counselor, or a composite of several counselors, it might be possible to establish criteria for a super counseling model which would be superior to any single counselor or composite of counselors. It may be that such a model would be too good. Some of the student acceptance of the automated counseling system may have been related to the fact that it attempted to simulate a human counselor, not only regarding counseling rules but also regarding counseling style. A super model might be rejected by the students since in developing its superiority some of the desirable human traits may have to be de-emphasized.

Implication for Experimental Implementation of an Automated Counseling System in a Real School Environment. Regarding the present computer-based counseling program certain, modifications will have to be made before the greatest use can be made of it in a real school environment.

1. The pre-interview pupil appraisal items which indicated significant difference between the counselor and the machine were related to academic ability. Analysis showed there was agreement between the machine and the counselor pertaining to the high SCAT score group but not the low score group. The lower end of the machine's prediction curve will have to be elevated to match that of the counselor.

2. Safeguards against students taking courses out of sequence or without proper prerequisites will have to be built into the program since 50 percent of the course changes involved courses in the same academic areas.

3. The courses will have to be separated into a number of catagories based on academic difficulty. The student will be asked

to look at the courses in his ability range before choosing courses above or below his ability. The present program grouped courses into special units, solids and electives. But some solids are more difficult than some special units and some are easier than certain electives.

4. Factors involving student's interests and personality should be included in the revised program.

5. A short course description defining the nature, the academic level, and necessary prerequisites for each course will have to be available to the student.

The implementation of the automated counseling system would have two major functions, (1) that of a computer based pupil information system and (2) counselor aid regarding educational planning.

The current machine program, with the minor modification already suggested, would be a valuable computer-based pupil information system. It would have value to both the students and the counselor. The students could use the system as a means of getting up-to-date progress reports on themselves, predictions about future grades, colleges available to them, and answers to questions regarding the nature of specific high school courses. There are systems today which use diagnostic data but unlike the proposed system students do not have direct accessability to it. The counselor could use the system by getting a print-out prior to each educational planning interview containing actuarial student appraisal data. Problem areas could be identified by the machine to be worked on during the counseling interview. The current system would have to be used as a counselor's tool in educational planning. The students could have ready access to the machine when they wished to make course plans. Out of 300 students only 150 may choose to even attempt a course planning interview by the machine. The counselor would review the course selection made by those students. Out of the 150 students who made machine course plans, the counselor may call in 50 students for purposes of discussing the possibility of revising their machine selected course plans.

Implications for Other Related Research and Development Concerned with Automation in Counseling and Guidance. Although it may be threatening to consider use of automation in an endeavor which relies so much on human characteristics, the rapidly expanding volume of information, with the accompanying need for students to have and use wisely, makes it necessary to give serious thought to automation in counseling and guidance. It is not suggested that machines replace counselors but that man-machine combinations, utilizing the favorable characteristics of both, might be used to meet the counseling and guidance needs of current and future generations. Further investigation of the counseling process through the systems approach may uncover better methods and criteria for the training of counselors. Some of the problems relating to counseling and guidance, and the application of computerized system in these areas, are discussed below.

Human counselors have certain qualities such as acceptance, empathy, and sensitivity to non-verbal communication. It is difficult to teach counselors' in training these qualities. It is often assumed that a person either has, or doesn't have, these traits and while training may improve these qualities, it doesn't create them. It may be possible, through analysis of both audio and video tape recordings of expert counselors' interview, to give behavioral definition of acceptance, empathy, and sensitivity. While these traits may never be programmed into a machine, if they are definible in behavioral terms, then perhaps some criteria can be developed which would enable these qualities to be taught to counseling students.

Another problemof an automated counseling system is that of interface, communication directly from the machine to a human. Although the students did not indicate any adverse reaction to the machine regarding interface, it is not known whether human to human interface was simulated in this study. The question arises as to whether a machine can simulate human to human interface. A problem also in machine-human interface is that of the communication stimulus. Would verbal communication be more effective than written communication?

Conclusions

On the basis of the results reported and the discussion in this chapter it is concluded that:

(1) The development of a composite counseling model which would incorporate the best features of several counselors is possible,

(2) the current automated counseling system, with the modifications discussed in this chapter, has value as a computer based pupil information system, and has use as an educational planning aid when used in conjunction with a counselor, and

(3) most students would voluntarily use the automated counseling system if it were implemented into a school system.

BIBLIOGRAPHY

Baer, Max F. "Washington Flashes," *The Personnel and Guidance Journal*, vol. 62, no. 8, April, 1964.

________. "Washington Flashes," *The Personnel and Guidance Journal*, vol. 63, no. 1, September, 1964.

________. "Washington Flashes," *The Personnel and Guidance Journal*, vol. 63, no. 2, October, 1964.

________. "Washington Flashes," *The Personnel and Guidance Journal*, vol. 63, no. 3, November, 1964.

Clark, Robert, and Gelatt, H. B. *Report on NDEA Guidance Research Project--Palo Alto Unified School District*, Technical Report, 1963.

Cogswell, John. *The Systems Approach as a Heuristic Method In Educational Development--An Application to the Counseling Function.* System Development Corporation, Santa Monica, 1962.

________, and Bushnell, Donald. *A Computer-Based Laboratory for Automation in School Systems*, System Development Corporation, Santa Monica, 1961.

Feigenbaum, Edward A., and Feldman, Julian. *Computers and Thought*. New York: McGraw-Hill, 1963.

Gelatt, Harry B. "Decision-Making: A Conceptual Frame of Reference for Counseling," *The Journal of Counseling Psychology*,. vol. 9, no. 3, 1962.

Ledley, Robert S., and Lusted, Lee B. "Computers in Medical Data Processing," *Operational Research*, vol. 8, 1960.

Loughary, John W. *Counseling in Secondary Schools*. New York: Harper and Brothers, 1961.

Rothney, J. W. *Guidance Practice and Results.* New York: Harper, 1958.

BIBLIOGRAPHY-continued

Schreiber, Flora, and Herman, Melvin. "The Computer Age in Psychoanalysis," *Science Digest*, January, 1965.

Tyler, Leona E. *The Work of the Counselor*. New York: Appleton-Century Crofts, Inc., 1953.

________. "Theoretical Principles Underlying the Counseling Process," *The Journal of Counseling Psychology*, vol. 5, no. 3, 1958.

________, and Sundberg, Norman D. *Factors Effecting Career Choices of Adolescents--Cooperative Research Project No. 2455*. University of Oregon, 1964.

Vandenberg, S. C., Silberman, H. F., Uhr, L., Wrigley, C. F., Holtzman, W. H., and Smith, P. A. "Computers in Behavioral Sciences: The Impact of Computers on Psychological Research," *Behavioral Science*, vol. 5, 1960.

Wrenn, C. Gilbert. *The Counselor in the Changing World*, American Personnel and Guidance Association, 1962.

Yabroff, William, W. *An Experiment of Teaching Decision-Making to Ninth Graders*, unpublished paper, May 1964.

APPENDIX A

PROGRAM FOR AUTOMATED INTERVIEW

As a result of the final phase of the preceding rapport section the student is asked to enter his code number which will have been assigned previously.

I. Enter Code Number -- Begin Interview

Machine validation of code number. Search out the student's name in stored data and write out:

Is your name ____________________________?

A. Yes
B. No

Please respond.

If A. -- proceed
If B. -- print out:

Please raise your hand and you will receive further instructions.

Your record indicates that as of the end of the last grade period, you were taking the following courses and earning the grades indicated for each course:

A. __________
B. __________
C. __________
D. __________
E. __________

II. Determination of Problem Areas

Do you find that you are having any problems with any of these courses:

A. Yes
B. No

If A. -- write out:

Please refer to the above list of courses and enter the letter(s) of the course(s) with which you are having problems.

-- store responses for counselor write out with lead line: This student indicates that he is having problems with Course________.

-- store S response to be used at Section III.

-- proceed to Section III Nature of Problem.

If B. -- Compare grades with S expectancy.

expectancy

proceed to Section IV Post High School Plans.

expectancy

Write out for the student:

Even though you indicate that you are not having any particular problems in your subject areas, it would seem that, on the basis of your standard test results, you are not doing as well as might be expected in Course________.

Store for write-out to counselor:

The student indicates no problems in his subject areas, but does not seem to be doing as well as expectancy would predict in Course________.

III. Nature of the Problem

-- write out reaction to messages to student using this form:

You indicate that you are having problems in ________ and ________. Please type in the nature of your problem or your problems. A few words will be o.k. You don't have to go into much detail. If you cannot describe the problems you are having, please push the "R" key.

-- If student punches "R" key set flag for 1 to 1 referral.

-- After student's response has been entered, write out to the student:

Would you like to continue with this interview at this time, or would you like to discuss your problem with your counselor before you continue?

A. I'll continue.
B. I'd like to talk with a counselor first.

-- If A

Proceed to Section IV Post High School Plans

-- If B

Proceed to closing statement Section VIII Close Interview

IV. Post High School Plans

Do you plan to continue your education after high school?

A. Yes
B. No

If A. -- write out:

What kind of school do you plan to attend?

If you are undecided at this time, press the "F" key and then type in the letters for the group you would most likely select if you had to choose now.

A. Group A. -- Ivy League Colleges
B. Group B. -- "Other" colleges and universities

C. Group C. -- California State Colleges
D. Group D. -- Junior Colleges
E. Group E. -- Technical and Vocational Schools
F. I have not yet decided on the kind of school that I wish to attend.

If "F" depressed -- write out to counselor:

Student indicates indecision in college or school choice at this time.

-- record Group

-- get S sex

-- get S GPA

-- search Expectancy Table I (see appendix)

-- get projected high school grades

-- write out:

The grades you get in high school largely determine the type of college you will be able to attend. Let's just take a look at your projected high school grades based upon your present performance.

Of students going on to Cubberley who have earned grades like yours in junior high:

______% earned A
______% earned B
______% earned C+
______% earned C
______% earned D or F

-- using the projected grades search Expectancy Table II (see appendix) for college groups the student has indicated above.

-- is student's choice group removed from his optimal expectancy group?

-- store + or -

if yes -- write out to student:

On the basis of your projected grades your present college choice indicates that:

(Choose appropriate lead in)

+ = you are shooting pretty high.
- = you are shooting pretty low.

The fact that you are thinking about what you are going to do after high school is a good sign. The important thing is to have some ideas and be thinking about them, and what you might eventually do. You ought to acquaint yourself with college entrance requirements at the schools you consider.

-- write out to counselor:

This student's college choice indicates that he is not properly evaluating his abilities. (Choose the appropriate response)

+ = This student's level of aspiration is 1 group above expectancy in his choice of colleges.

- = This student is choosing colleges 1 group below what might be expected.

If B. (referring to first question under Section IV, "Do you plan. . .")

-- write out:

What do you plan to do after high school?

A. Get a job
B. Join the military
C. I have not yet decided
D. If the above choices do not include what you intend to do after high school, please push the "D" key and type in your plans.
E. Become a housewife

If C -- write out to student:

> You don't have to be fixed on a specific goal right now, but the important thing is to have some ideas and be thinking about what you might eventually do. Don't just allow yourself to drift into something, but go someplace that you want to go.

-- get S sex

-- get S GPA

-- search Expectancy Table I (see appendix)

-- get projected high school grades

-- using projected grades, search Expectancy Table II.

-- does the student's optimal expectancy lie below college levels?

If no -- write out to counselor:

> This student does not appear to be basing his post high school plans on his projected academic ability. Other considerations ought to be looked at, and encouragement sought and offered.

At present which of the following areas seems to appeal to you most as a field for further education or employment?

A. Business
B. Physical Science
C. Biological Science
D. Social Science
E. Language
F. Music and Arts
G. Technical or Vocational Fields

Now that we've got some idea of what it is that you'd like to do after high school, let's look at your high school course plans.

V. Course Plans

The required courses for the 10th grade are:

English 2
Contemporary World History and Geography
Physical Education

In addition to these courses please enter the Code Numbers of the other courses that you would like to take. (For the courses available and their Code Numbers, please see page ___ of the Informational pamphlet. A work sheet to help you in keeping a record of your course selections is provided on page ___ of this pamphlet.)

If for some reason you find that you are unable to make your course selections at this time, please press the "R" key.

-- if "R" key depressed, proceed to closing statement Section VIII Close Interview.

machine check on number of solids

Is the number of solids 4?

If yes -- check S average -- average B?
If no -- write out to student:

In order to carry five solids you should have an overall "B" average in your previous year's course work.

Present following only for 10th grade:

Keeping the course load to four solids helps you to do better in your academic subjects and also gives you a chance to explore non-academic areas.

If it is desirable for your planning to take additional courses, or to get courses out of the way so you can take other courses in which you have a special interest, you might consider taking some summer courses.

To counselor write out:

On the basis of course plans for the 10th grade, it would be well to earmark this student for a counseling consultation early in the 10th year, so that his course load can be re-evaluated and lightened if desirable or if necessary.

Are you satisfied with the courses you have indicated, or would you like the opportunity to change them some way?

A. I'm satisfied.
B. I would like to change them.

If B -- print out elected courses with this lead line:

Type in the letter of the course(s) you would like to change and the Code Number of the course you would like to choose in its place.

Do you anticipate taking any courses during the summer?

A. Yes
B. No

If A -- write out:

Type in the Code Number(s) of the course(s) you plan to take.

Present only after the 10th grade:

At the ninth grade your projected 11th and 12th grade schedule is considered to be tentative. Firm scheduling decisions can be made only on the basis of your year by year performance. What you decide to take in the 11th and 12th grade will very much be governed by what it is that you want to do when you get out of high school. Since a person's plans tend to change over a period of time, you should see your counselor toward the end of your 10th year in order to evaluate your 11th and 12th grade program in the light of your current goals.

Although we will be talking only about tentative plans, which you will be able to change, let's look at your high school course plans as you see them now.

Now let's look at your 11th grade schedule.
The required courses for the 11th grade are:

U. S. History
English 3
Physical Education

In addition to these courses, please enter the Code Numbers of the other courses that you would like to take.

machine check on solids

number greater than 4?

If yes -- average B?
If no -- present only the first part of the message presented above.

In order to take five solids, you should have an overall B average in your previous year's work.

Repeat pages 7 and 8

Are you satisfied with the courses you have indicated, or would you like the opportunity to change them some way?

A. I'm satisfied.
B. I would like to change them.

If B -- print out elected courses with this lead line:

Type in the letter of the course(s) you would like to change and the Code Number of the course you would like to choose in its place.

Do you anticipate taking any courses during the summer?

A. Yes
B. No

If B -- write out:

Type in the Code Number(s) of the course(s) you plan to take.

Now let's look at your 12th grade schedule.
The required courses for the 12th grade are:

Government II
Physical Education

In addition to these courses please enter the Code Numbers of the other courses which you would like to take.

machine check on solids

number greater than 4?

If yes -- average B?
If no -- present only the first part of the message presented above.

In order to take five solids, you should have an overall B average in your previous year's work.

Repeat pages 7 and 8

Are you satisfied with the courses you have indicated, or would you like the opportunity to change them some way?

A. I'm satisfied.
B. I would like to change them.

If B -- print out elected courses with this lead line:

Type in the letter of the course(s) you would like to change and the Code Number of the course you would like to choose in its place.

Do you anticipate taking any courses during the summer?

A. Yes
B. No

If B -- write out:

Type in the Code Number(s) of the course(s) you plan to take.

machine check:

Is the student college bound?
Check the answer to question about further schooling and kind of post high school plans.

If yes:

Does the student's proposed schedule contain sufficient special units to correspond with the kind of college or school that he wishes to attend?

Check his answers to questions in post high school plans.

Group A = 7 or more special units
Group B = 3-6 special units.
Group C = 0-2 special units
Group D = no special units are required

If yes -- go on
If no -- store for future write out to student:

In order to attend a college or university in Group_____, you will have to revise your high school course plans to include more special units. You have chosen, as your plans stand now, _____ special units. For Group_____ schools, you need_____ more special units.

If the student has chosen Group A or B add:

However, your present course plans may stand if you wish to change your choice of colleges.

Write out to counselor:

The student seems to need some assistance in planning courses for the 11th and 12th grade. Some explanation of college requirements in terms of special units is in order.

machine --

Does this projected schedule, including summer courses, contain courses relevant to his chosen area of education or employment?

Compare student's projected schedule with area in post high school plans.

What is the indicated major area?

If it is:		Then it should include:	
A.	(Business)	4 years English	
B.	(Physical Science)	" "	Math IV Physics
C.	(Biological Science)	" "	Biology Chemistry
D.	(Social Science)	" "	
E.	(Language)	" "	2 or more years of at least 1 foreign language
F.	(Music and Arts)	" "	
G.	(Technical/Vocational)	" "	

Using an exception type report on students who do not have the courses in the above table included in their schedule, store for future write-out to student these rules:

If in categories A-F not taking 4 years English:

It is a good idea for all college bound students to take four years of English.

If in category B not taking Math IV or Physics:

Students planning to go into the physical sciences would do well to include Math IV and Physics in their course program.

If in category C not taking Biology or Chemistry:

Students planning to go into the biological sciences would do well to include Biology and Chemistry in their course program.

If in category E not taking 2 or more years of at least 1 foreign language:

Students planning to go into languages should include 2 or more years of at least 1 foreign language in their course program.

Write out accumulated messages.

Well, that about covers our examinations of your projected high school plans. Would you check over this print-out of your courses?

-- print out S course plans

How do you feel about this schedule?

A. I want my course plans to stay as they are.
B. I want my course plans to stay as they are, although I have some reservations about them.
C. I would like to revise my course plans.
D. I would like to confer with a counselor about my course plans.

If A -- record for counselor print out:

This student wants course plans to remain just as they are.

If B -- record for counselor print out:

This student has some reservations about his course plans.

If C -- print out previous course plans for grades 10, 11, and 12.
repeat choice cycle

Type in the letter of the course(s) you would like to change and the Code Number of the course you would like to choose in its place.

If D -- set flag for counselor referral.

Do you have any further concerns or any questions about any information that has been given to you?

A. Yes
B. No

If A -- write out:

Please feel free to type in your questions or concerns and they will be referred to your counselor.

If B -- proceed to final information print-out (counselor expectations, high school expectations, etc.)

VI. High School Expectations

--Informational rules used by Hutch to be given to all students reaching this point in the interview. Write out:

You might be wondering about how things are done over at Cubberley.

The first event on the first day will be a class meeting (place is to be posted on bulletin boards). Here you will meet your class and school officials. Following this meeting, you will be given a student handbook, general information bulletin, and a class schedule. From here on out you will attend shortened revisions of your regular classes. In case you are confused about the terms used at Cubberley, their lanes are the same as your tracks, and their blocks are the same as your periods. The blocks are called by letter names A, B, C, D rather than by numbers 1, 2, 3, 4.

VII. Counselor Expectations

-- write out:

When you get up to the high school it would be well if you would get to know your counselor as soon as possible. He's there to help you and he'll be writing recommendations when it comes time to think about jobs or college. So it's to your advantage to make the first move in getting to know him.

VIII. Close Interview

--write out:

We hope this interview has provided you with some information to think about in planning your high school program.

It's been nice interacting with you.

The interview is now ended. Thank you for your cooperation.

APPENDIX B

PRE-INTERVIEW PUPIL APPRAISAL COUNSELOR

Analysis of Cumulative Folder

The statements concerning the student's projected high school GPA and the type of college he could enter should be based not only on actuarial predictions but also on any additional information about the student which would modify appraisal statements. If you feel the actuarial predictions do not apply to this student, please modify these on the basis of your judgment.

Grade Point Average

Place the number of chances out of ten the student has for achieving the following grade ranges in the blanks provided.

________ out of ten	less than 2.00	(D and F)
________ out of ten	2.00 to 2.49	(C)
________ out of ten	2.50 to 2.99	(C+)
________ out of ten	3.00 to 3.49	(B)
________ out of ten	3.50 to 4.00	(A)

If there are any comments you wish to make please do so on the back of this form.

Name of Student ______________________________

APPENDIX C

PUPIL APPRAISAL CHECK LIST

Instructions to Counselor. Study the data in the cumulative for each student assigned in this experiment. After studying each folder place a check before the statements that apply to that student. Place any additional comments at the bottom or on the back of this form.

Student's Name ______________________________

_____ 1. Student's grades have gond down quite a bit. Ask about this in interview. Possibly there are personal problems.

_____ 2. Student's grades have gone up. Ask about this at the next interview.

_____ 3. This student should be watched closely. He will probably need remedial courses.

_____ 4. Student is a potential drop-out.

_____ 5. Should be headed for college. Encourage student to explore widely in academic areas.

_____ 6. Low counseling priority. No problems apparent.

_____ 7. Student is getting better grades than one would expect from looking at aptitude scores.

_____ 8. Student is not achieving as well as aptitude scores would predict.

_____ 9. Cumulative folder contains no aptitude scores for this student. Try to get some.

_____ 10. Look out for over-ambitious plans.

_____ 11. Student may need to strengthen quantitative skills or will probably experience academic difficulty.

_____ 12. Student should improve verbal skills. If not, student may not be able to attain desired academic goals.

_____ 13. The disparity between aptitude scores and achievement is so great that one is led to suspect aptitude test. Check test.

_____ 14. Cumulative folder contains no grades for this student.

APPENDIX D

POST INTERVIEW PUPIL APPRAISAL
COUNSELOR

Analysis of Interview

The answers to the following questions need not be based on actuarial predictions alone. Your responses may be modified by any additional information you wish to use.

1. Does the student indicate he is having problems with his courses?
   _____yes _____no
2. Does the student deny any problems with courses when according to the expectancy scores he is having problems? _____yes _____no
3. Does the student indicate he is going to college? _____yes _____no
4. Is he realistic in his plans to attend college? _____yes _____no
   (Guide to Question 4. If he is planning on college and does not have at least a 50% chance of entering some type of college or trade school, for example a 40% chance of entering a trade school and a 10% chance of entering a junior college, he is not being realistic. If he is not planning on college but has a 50% chance of entering some type of college or trade school he is not being realistic.)
5. Is he planning to take more solids than his GPA warrants?
   _____yes _____no
6. Is he planning to take enough special units to enter the type of college he has selected? _____yes _____no
   (If he is not planning to enter college the answer would be yes.)
7. Is he planning on taking the courses necessary to prepare him for his proposed college major? _____yes _____no
   (If he is not planning on college the answer would be yes.)

Name of Student____________________________________

Name of Counselor__________________________________

APPENDIX E

STUDENT'S COURSE SELECTION FORM

Please place the title of the courses selected for the 10th grade in the space below. Be specific. For example, write in Art I, not just Art. Also include any summer courses to be taken between the 9th and 10th grades and indicate these are summer courses by placing (S) behind the course title.

World History and Geography	
English II	
Physical Education	

Do you have any reservations about your 10th grade courses? ________ yes or no

Please place the title of the courses selected for the 11th grade in the spaces below. Also include any summer courses to be taken between the 10th and 11th grade. Mark these with (S).

U. S. History	
English III	
Physical Education	

Do you have any reservations about your 11th grade courses? ________ yes or no

Please place the title of the courses selected for the 12th grade in the spaces below. Also include any summer courses to be taken between the 11th and 12th grade. (Mark these with (S).

Government II	
Physical Education	

Do you have any reservations about your 12th grade courses? ________ yes or no

APPENDIX F

QUESTIONS FOR ANALYSIS OF MACHINE LIMITATIONS

Questions to be asked of those students who did not develop total course plans during the machine interview:

1. Was your inability to make total course plans caused by the machine not presenting the material clearly?

2. Did you feel the machine did not give you enough information to make adequate choices? If not, in what areas do you feel more information is needed?

Questions to be asked of all students:

1. Did the machine interview bore you or cause you to become restless?

2. Did the machine, by not letting you know if your responses were good or poor, make it difficult to make choices?

3. Did the lack of a counselor being in the room while you were having the machine interview make it more difficult to make decisions?

4. Did the automated interview meet your needs in terms of high school course planning?

5. Did the automated interview meet your expectations of what an educational planning interview should be?

APPENDIX G

AREAS TO BE COVERED IN COUNSELOR'S INTERVIEW

In addition to the areas usually discussed in your educational planning interviews, please include the following items.

1. What courses is the student currently taking?
2. Does the student indicate he is having any problems with his present courses?
3. Does the student intend to enter college?
4. If so, does he plan to enter
   a. Ivy League Colleges,
   b. "other" colleges and universities,
   c. California State Colleges,
   d. junior colleges, or
   e. technical or vocational schools?
5. Have the student make course plans for the 10th grade.
6. Have the student make course plans for the 11th grade.
7. Have the student make course plans for the 12th grade.
8. If the student is college bound have him select a tentative college major from the list below.
   a. Business
   b. Physical Science
   c. Biological Science
   d. Social Science
   e. Language
   f. Music and Art
   g. Technical and Vocational
9. If, at the close of the interview, the student wishes to change any courses he has previously selected for high school, permit him to do so.

APPENDIX H

ACTUAL AUTOMATED INTERVIEW

```
YOU ARE ABOUT TO PARTICIPATE IN AN INTERVIEW WITH AN
AUTOMATED COUNSELOR.
THE COMPUTER WILL HELP YOU PLAN WHAT YOU WANT TO DO
IN HIGH SCHOOL AND IN LATER LIFE.
BUT FIRST, JUST TO LET THE COMPUTER KNOW YOU ARE THERE
PLEASE TYPE THE LETTER  A  AND A CARRIAGE RETURN
(RED KEY ON THE RIGHT-HAND SIDE OF THE KEYBOARD).

**** A
GOOD. . .
THE MOST IMPORTANT KEY IS THE  CR  KEY (RED KEY ON THE
RIGHT).  YOU WILL USE IT TO LET THE COMPUTER KNOW THAT
YOU HAVE MADE AN ANSWER.  JUST FOR PRACTICE, TYPE THE
LETTER  B  AND A  CR  (RED KEY).

**** B
OK. . . . .
SOMETIMES YOU WILL BE ASKED TO ANSWER A YES OR NO
QUESTION.  WHEN YOU ARE, JUST TYPE  YES  OR  NO AND A  CR
DON'T FORGET THE CR.
LET'S TRY IT.  HERE IS A QUESTION---
ARE YOU IN CALIFORNIA NOW?
PLEASE TYPE YES OR NO.

****  YES
FINE.  .

MANY OTHER PEOPLE ARE USING THIS COMPUTER RIGHT NOW.
ONCE IN A WHILE THE COMPUTER WILL HAVE TO TAKE CARE OF
THEIR URGENT NEEDS.  WHEN THIS HAPPENS, YOU MAY FIND
THAT YOU HAVE TO WAIT A MOMENT OR TWO.  DON'T WORRY,
THE COMPUTER WILL COME BACK TO TAKE CARE OF YOU AS
SOON AS IT CAN.
WHEN YOU HAVE READ THIS, TYPE  OK  AND A CR.
```

```
**** OK
GOOD.
BY NOW YOU HAVE NOTICED THAT BEFORE YOU TYPE AN
ANSWER, THE TYPEWRITER TYPES STARS LIKE THIS-

****
THIS IS TO LET YOU KNOW THAT IT IS TIME FOR YOU TO TYPE
SOMETHING. YOU SHOULD NEVER TYPE ANYTHING UNTIL AFTER
THE STARS ARE TYPED OUT BY THE COMPUTER.
DO YOU UNDERSTAND?
PLEASE TYPE YES OR NO.

**** YES
ANOTHER VERY IMPORTANT KEY IS THE / OR "SLASH" KEY.
IT IS THE GREEN KEY ON THE BOTTOM RIGHT OF THE KEYBOARD.
LOOK FOR THE / KEY (GREEN KEY). WHEN YOU FIND IT, TYPE
/ AND A CR.

**** /

SOMETIMES YOU WILL HAVE TO TYPE MORE THAN ONE LINE AND
THE COMPUTER CANNOT TELL IN ADVANCE HOW MANY LINES
YOU WILL TYPE. IN SUCH A CASE, YOU WILL LET THE COMPUTER
KNOW THAT YOU HAVE FINISHED BY TYPING A / AND A CR.
WHAT YOU TYPE WILL LOOK SOMETHING LIKE THIS---

**** 1

**** 2

**** /

LET'S TRY IT.
TYPE 1 AND A CR, 2 AND A CR, AND A / AND A CR.
(WAIT FOR THE STARS.)

**** 1

**** 2

**** /

FINE. .
```

```
PLEASE TYPE YOUR ID NUMBER AND A CR

**** 61
  IS YOUR NAME JANE DOE

**** YES
ACCORDING TO MY RECORDS THIS IS HOW YOU DID LAST SEMESTER.
  CODE       COURSE            GRADE
    1     P.E.                   B
    2     ENGLISH I              C
    3     GENERAL SCIENCE        C
    4     EUROPEAN HISTORY       B
    5     TYPING                 B
    6     GENERAL MATH           C
IS THIS CORRECT? IF SO, TYPE YES IF NOT, TYPE NO

**** YES
ARE YOU HAVING ANY PROBLEMS WITH ANY OF THESE COURSES?
PLEASE TYPE YES OR NO.

**** NO
OK. . . . .
DO YOU PLAN TO CONTINUE YOUR FORMAL EDUCATION BEYOND
HIGH SCHOOL?

**** YES
WHICH OF THE FOLLOWING IS MOST LIKE THE SCHOOL YOU PLAN
TO ATTEND?
1  IVY LEAGUE COLLEGE
2  OTHER COLLEGE OR UNIVERSITY
3  CALIFORNIA STATE COLLEGE
4  JUNIOR COLLEGE
5  BUSINESS OR VOCATIONAL SCHOOL
6  I HAVE NOT YET DECIDED
TYPE THE APPROPRIATE CODE.

**** 4
DO YOU INTEND TO MAJOR IN ENGINEERING OR ONE OF THE
SCIENCES?
PLEASE TYPE YES OR NO.

**** NO
```

```
WHICH OF THE FOLLOWING APPEALS TO YOU MOST AS A COLLEGE
MAJOR---

1  BUSINESS
2  SOCIAL SCIENCE
3  MUSIC AND ARTS
4  FOREIGN LANGUAGES
5  EDUCATION
6  ENGLISH

TYPE THE APPROPRIATE CODE.

****  6
OK. . . . .
THE GRADES YOU GET IN HIGH SCHOOL LARGELY DETERMINE
THE TYPE OF COLLEGE YOU WILL BE ABLE TO ATTEND.
LET'S JUST TAKE A LOOK AT YOUR PROJECTED HIGH SCHOOL
GRADES BASED ON YOUR PRESENT PERFORMANCE.
STUDENTS WHO GOT GRADES LIKE YOURS IN JUNIOR HIGH,
DID AS FOLLOWS AT CUBBERLEY---

    10 PER CENT EARNED  A OR B
    60 PER CENT EARNED  C+
    30 PER CENT EARNED  C

ON THE BASIS OF YOUR PROJECTED GRADES, YOUR PRESENT
COLLEGE CHOICE INDICATES THAT YOU ARE THINKING PRETTY
REALISTICALLY ABOUT YOUR FUTURE LIFE.

NOW THAT WE'VE GOT SOME IDEA OF WHAT YOU'D LIKE TO DO
AFTER HIGH SCHOOL, LET'S LOOK AT YOUR HIGH SCHOOL
COURSE PLANS. IN THE 10TH GRADE, THE REQUIRED COURSES
ARE---

    ENGLISH 2
    CONTEMPORARY WORLD HISTORY AND GEOGRAPHY
    PHYSICAL EDUCATION

WHAT OTHER COURSES WOULD YOU LIKE TO TAKE NEXT YEAR?
LOOK AT THE LIST OF COURSES.
WHEN YOU HAVE DECIDED WHAT COURSES YOU WANT TO TAKE,
TYPE  YES.
IF YOU CAN'T MAKE UP YOUR MIND AT ALL TYPE  NO
```

```
**** YES
GOOD.
TYPE THE CODE NUMBER OF EACH COURSE YOU WANT TO TAKE.
TYPE A  CR  AFTER EACH NUMBER.
WHEN YOU ARE ALL THROUGH,  TYPE A  /  AND A CR.

**** 24

**** 16

**** 50

**** /
OK, HERE IS THE PROGRAM YOU HAVE PROPOSED

     ENGLISH 2
     CONTEMPORARY WORLD HISTORY AND GEOGRAPHY
     PHYSICAL EDUCATION

       TYPING 11  S
       GENERAL BUSINESS  S
       FOODS  1

ARE YOU SATISFIED WITH THIS PROGRAM?
IF SO,  TYPE  YES
IF YOU WOULD LIKE TO CHANGE IT,  TYPE  CHANGE

**** YES
OK. . . . .
THAT LOOKS LIKE A PRETTY GOOD 10TH GRADE PROGRAM.
DO YOU ANTICIPATE TAKING ANY SUMMER COURSES THAT
YEAR?

**** YES
GOOD.  TYPE THE CODES OF THOSE COURSES YOU WILL TAKE
IN THE SUMMER.
TYPE A  CR  AFTER EACH NUMBER.
WHEN YOU ARE ALL THROUGH,  TYPE A  /  AND A CR.

**** 130

**** /
```

```
ALRIGHT.  THAT MEANS THAT IN SUMMER SCHOOL YOU WILL
TAKE DRIVER EDUCATION
OK. . . .
AT THE 9TH GRADE YOUR PROJECTED 11TH AND 12TH GRADE
SCHEDULE IS CONSIDERED TO BE TENTATIVE.  FIRM DECISIONS
CAN BE MADE ONLY ON THE BASIS OF YOUR YEAR BY YEAR
PERFORMANCE.
WHAT YOU DECIDE TO TAKE IN THE 11TH AND 12TH GRADES
WILL BE GOVERNED LARGELY BY WHAT IT IS YOU WANT TO DO
AFTER HIGH SCHOOL.  SINCE A PERSON'S PLANS TEND TO CHANGE
OVER A PERIOD OF TIME,  YOU SHOULD SEE YOUR COUNSELOR
TOWARD THE END OF YOUR 10TH YEAR IN ORDER TO EVALUATE
YOUR 11TH AND 12TH GRADE PROGRAM IN THE LIGHT OF YOUR
CURRENT GOALS.

ALTHOUGH WE WILL BE TALKING ABOUT TENTATIVE PLANS,
WHICH YOU WILL BE ABLE TO CHANGE,  LET'S LOOK AT YOUR
HIGH SCHOOL COURSE PLANS AS YOU SEE THEM NOW.

LET'S THINK ABOUT THE 11TH GRADE.

THE REQUIRED COURSES FOR THE 11TH GRADE ARE---

     ENGLISH 3
     U.S. HISTORY
     P.E.

WHAT OTHER COURSES WOULD YOU LIKE TO TAKE IN THE 11TH
GRADE?  LOOK AT THE LIST OF COURSES.


WHEN YOU HAVE DECIDED WHAT COURSES YOU WANT TO TAKE,
TYPE  YES.  IF YOU CAN'T MAKE UP YOUR MIND AT ALL TYPE
NO

****  YES
GOOD.
TYPE THE CODE NUMBER OF EACH COURSE YOU WANT TO TAKE.
TYPE A  CR  AFTER EACH NUMBER.
WHEN YOU ARE ALL THROUGH,  TYPE A  /  AND A CR.

****  18
```

```
****

WHAT?  TRY AGAIN

**** 18

**** 29

**** 93

**** /
SOMETHING IS WRONG.  YOU SEEM TO HAVE PUT IN SOME
WRONG NUMBERS.  START YOUR LIST FROM THE BEGINNING
AGAIN, PLEASE.

TYPE THE CODE NUMBER OF EACH COURSE YOU WANT TO TAKE.
TYPE A  CR  AFTER EACH NUMBER.
WHEN YOU ARE ALL THROUGH, TYPE A  /  AND A CR.

**** 18

**** 29

**** 93

**** /
OK, HERE IS THE PROGRAM YOU HAVE PROPOSED

     ENGLISH 3
     U. S. HISTORY
     P. E.

     CLERICAL PRACTICE  S
     TYPING 22  S
     MATH M 1

ARE YOU SATISFIED WITH THIS PROGRAM?
IF SO, TYPE  YES
IF YOU WOULD LIKE TO CHANGE IT, TYPE  CHANGE

**** YES
OK. . . . .
THAT LOOKS LIKE A REASONABLE 11TH GRADE PROGRAM.
DO YOU ANTICIPATE TAKING ANY SUMMER COURSES THAT YEAR?
```

```
**** NO
NOW LET'S THINK ABOUT THE 12TH GRADE.
THE REQUIRED COURSES FOR THE 12TH GRADE ARE---

     GOVERNMENT 2
     PHYSICAL EDUCATION

(ENGLISH 4 IS NOT REQUIRED, BUT YOU MAY WANT TO TAKE IT.)

WHAT OTHER COURSES WOULD YOU LIKE TO TAKE IN THE 12TH
GRADE? LOOK AT THE LIST OF COURSES.
WHEN YOU HAVE DECIDED WHAT COURSES YOU WANT TO TAKE,
TYPE  YES.  IF YOU CAN'T MAKE UP YOUR MIND AT ALL TYPE
NO

**** YES
GOOD.
TYPE THE CODE NUMBER OF EACH COURSE YOU WANT TO TAKE.
TYPE A  CR  AFTER EACH NUMBER.
WHEN YOU ARE ALL THROUGH,  TYPE A  /  AND A CR.

**** 51

**** 15

**** 92

**** /
OK, HERE IS THE PROGRAM YOU HAVE PROPOSED

     GOVERNMENT 2
     PHYSICAL EDUCATION

     FOODS 2
     BOOKKEEPING 1
     MATH REVIEW

ARE YOU SATISFIED WITH THIS PROGRAM?
IF SO, TYPE  YES
IF YOU WOULD LIKE TO CHANGE IT,  TYPE  CHANGE

**** YES
```

OK. . . . .
THAT'S A PRETTY GOOD 12TH GRADE PROGRAM.
DO YOU ANTICIPATE TAKING ANY SUMMER COURSES THAT YEAR?

**** NO
IT IS A GOOD IDEA FOR ALL COLLEGE BOUND STUDENTS TO TAKE 4 YEARS OF ENGLISH. GIVE THIS SOME THOUGHT.

I HOPE THIS INTERVIEW HAS PROVIDED YOU WITH SOME INFORMATION TO THINK ABOUT IN PLANNING YOUR HIGH SCHOOL PROGRAM.
IT'S BEEN NICE INTERACTING WITH YOU.
THANK YOU, JANE
THIS IS THE END OF THE INTERVIEW